JPRS 80754

6 May 1982

# USSR Report

## CHEMISTRY

No. 85

FBIS FOREIGN BROADCAST INFORMATION SERVICE

## NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

## PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

JPRS 80754

6 May 1982

# USSR REPORT
## CHEMISTRY
## No. 85

## CONTENTS

ALKALOIDS

Electrochemical Epimerization of Solasodine Alkaloid .............. 1

ANALYTICAL CHEMISTRY

Phase Equilibrium Diagram for Uranium-Plutonium- Carbon System in 1200-2430°C Range .............. 2

Analytical Application of Cerium Complexes With Organophosphorus Compounds .............. 3

Use of Petroleum Sulfoxides in Extraction-Polarographic Determination of Uranium .............. 3

Determination of Fluorine in Uranium and Its Compounds by Means of Fluoro-Selective Electrode .............. 4

Spectrophotometric Determination of Peroxide Compounds in Presence of Phosphinate and Phosphonate .............. 4

N-Arylglycosyl Amines, Part 3: Quantitative Gas Chromatographic Analysis of α and β Anomers of Some N-Arylglycosyl Amines ...... 5

Spectroscopic Study of Structure of Silicon Antimonate and Phosphosilicon Antimonate Cation Exchangers .............. 6

Effect of Phenols on Radiation-Initiated Oxidation of Benz(a)pyrene .............. 6

Isolating Impurities From Yellow Phosphorus With Ethyl Alcohol .... 7

Extracting Halogen Phenols From Water With Simple and Complex Esters .... 7

BIOCHEMISTRY

Microbiological Synthesis of 3-Hydroxy-7-Bromo-(O-Chlorophenyl)-1,2-Dihydro-3H-1,4-Benzdiazepine-2-One by Immobilized Actinomycetes .... 8

CATALYSIS

Influence of Cobalt Naphthenate on Formation of Some Products of Oxidative Destruction of Cyclohexane .... 9

Carbonylation of Acetylene in Palladium (II) Bromide and Sulfonate Solutions in Presence of Triphenylphosphite and p-Toluenesulfonic Acid .... 10

CHEMICAL INDUSTRY

Caprolactam Plant Reaches Output Capacity .... 11

New Plastics Plant Enjoys Early Success .... 12

COAL GASIFICATION

Synfuel Facility Under Construction .... 13

COMBUSTION

Calculating Heterogeneous Detonation of Liquid Fuel Monodispersion Air Suspension Including Ignition Retardation .... 14

FERTILIZERS

Phosphate Production Suffers From Indecisive Policies .... 15

$(NH_4)_2S_2O_8$--$(NH_4)_2HPO_4$--$H_2O$ System .... 19

Efficacy of Phosphorite Meal and Phosphate Content of Soddy Podzolic Soil With Application of Large Doses of Lime .... 19

Effects and Residual Influence of Phosphorus Fertilizers on Irrigated Dark-Chestnut Calcareous Soil: Report 1 ........... 20

Effects, Residual Influence and Cumulative Efficacy of Phosphorus Fertilizers in Soddy Podzolic Soil ................ 21

Impact of Mineral Fertilizers on the Environment ................ 21

Using Binary Tripolyphosphates as Capsuling Agents of Granulated Fertilizers ........................................ 22

INORGANIC COMPOUNDS

Ammonium Tripolyphosphate $(NH_4)_5P_3O_{10}$ .......................... 23

NITROGEN COMPOUNDS

Nontraditional Nitrogenic Macroheterocyclic Systems With High Degree of Conjugation (Review) ................................ 24

Reaction of Arenosulfo Acid Azides With Trialkyl Stibines and Trialkyl Stibites ...................................... 24

ORGANOMETALLIC COMPOUNDS

Synthesis and Examination of Ni(II) Complexes With Unsaturated Phosphine Oxides ................................ 26

Controlled Design and Synthesis of Biologically Active Silicone Compounds ........................................ 27

Physical Chemical Study of $CaO-H_3PO_4-H_3AsO_4-H_2O$ System at 25°C: Report 3 ........................................ 28

Synthesis and X-ray Study of Polyphosphide $RbP_{11}$ ................ 28

Reactions of Phosphoryl Thioureas With Mercury Oxide and Nucleophilic Reagents ..................................... 29

ORGANOPHOSPHORUS COMPOUNDS

Muscarinolytic Action of Some Aminoalkyl Esters of Hydroxyalkyl Phosphinic Acids .................................. 30

Properties of β-Chloro-β-(α-Thienyl)Vinylphosphonic and β-Chloro-β-(α-Thienyl)Vinylthiophosphonic Acid Dichlorides .... 31

Ferrocenylaminomethylphosphonates and Ferrocenylaminomethylthiophosphonates Containing Heterocyclic Radicals ........ 31

Isomerization of $P^{III}$ Acid Esters Under Influence of Organic Acids .................................................. 32

Infrared Spectroscopy Used To Study Structure of Amides and Hydrazides of Phosphorylated Carboxylic Acids .................. 33

General Reactivity of Compounds of Tetracoordinated Phosphorus Atom .............................................. 33

Phosphorus-Containing Intermediate Products and Dyes, Part 6: Synthesis of Derivatives of Aliphatic-Aromatic Phosphonic and Phosphinic Acids Based on Reactions of Phosphorus Pentachloride and Phosphorane Ethyltetrachloride................ 34

Reaction of Benzoin With Acid Chlorides of Trivalent Phosphorus Acids ............................................. 34

Properties of Diamidochlorophosphazo Alkanes ...................... 35

Photoinitiated Interaction of Phosphorus Tribromide With Phenylacetylene and Styrene ................................... 36

Synthesis of N-Glycosyl Amidophosphites ........................... 36

Interaction of Phosphorus Pentachloride and Its Derivatives With Sodium Thiosulfate .................................... 37

Phosphorylated and Thiophosphorylated Aminoheterocyclic Compounds ........................................................ 38

Polyphosphazenes ................................................... 38

Reaction of Trimethylphosphite With 2,5-Bis(Carbomethoxy)-3,4-Diphenylcyclopentadienone ................................ 39

Effect of Amine Chlorohydrates on Reaction Course of Tetraalkyldiamidotrimethylsilylphosphite With Acetyl Chloride .. 40

Mixed Chlorinated Esters of Dialkylphosphoric Acids and Their Biological Properties ........................................ 40

Reactions of Trivalent Phosphorus Compounds With Azidocarboxylic Acids, Part 2: Phosphazobetain-Phosphoric Isomerization .......... 41

Reactions of β-Nitrostyrenes With Trialkyl Phosphites .......... 41

Halogenation of Dialkyl Esters of 5-Methyl-1,3,4-Hexatriene-3-Phosphonic Acid .......... 42

Synthesis of Six-Member Bicyclic Phosphorus-Containing Heterocycles--Derivatives of 1,2-Oxaphosphorine .......... 42

Reaction of N-(Phenylalkoxymethylene)Amidoethylenephosphite With Carbonyl Compounds .......... 43

Isomerization of Methylenamidophosphites .......... 43

Reaction of Dialkylmonothiophosphoric and Diphenylmonothiophosphinic Acids With Cyclohexylisonitrile .......... 44

Synthesis of α-Diphenyl(Diisopropyl)Phosphinyl-β-Phenylpropionic Acid Esters .......... 44

Synthesis of m-Dialkyl(Diphenyl)Phosphinylmethylbenzoic Acid Nitriles .......... 45

Reaction of Phosphinic Acids With Phosphorus Thiochloroxide .......... 45

Reaction of Hypophosphorous Acid With Acetylenic Alcohols .......... 46

Synthesis of Sodium Derivatives of Phosphorylated 1,1-Dicyanoethanes .......... 46

PESTICIDES

Cembrane Alcohols: New Type of Hormonal Plant-Growth Inhibitors...47

POLYMERS AND POLYMERIZATION

New Heat Resistant Polymers Find Promising Industrial Applications .......... 48

New Route for Synthesis of Aromatic Polymers .......... 52

Synthesis, Polymerization and Photoconductor Properties of p-Aminostyrene .......... 52

Research Development in Area of High Strength Thermally Stable Polymers for National Economy .................................. 53

Survey of Studies on Synthesizing High-Temperature Polymeric Superconductors .................................. 54

Mechanism for Increasing Impact Strength of Plastics ............. 54

Effects of Low-Molecular By-Products on Propylene Polymerization Rate in Catalytic System Based on $TiCl_3$ ......... 55

Radiational Low-Temperature Cation Graft Polymerization of Vinyl-n-Butyl Ether to Polyvinylchloride in Glass Point Range .................................. 56

RUBBER AND ELASTOMERS

Temperature Effect on Adhesive Properties of Thermoplastic Polymer Mixtures .................................. 57

Effect of Some Factors on Limiting (Static) Shear Stress of Carbamide Complexes With n-Heptane .................................. 57

Equilibrium Swelling of Filled Natural Rubber Vulcanizates ....... 58

Synthesizing and Properties of Urethane Elastomers Based on Poly-Epsilon-Caprolactone and Polyoxypropylene Glycol .......... 59

Esteracrylate Derivatives as Modifiers of Tread Rubber ........... 59

WATER TREATMENT

Electrodyalysis Used To Purify Liquid Sewage Containing Cyanide .................................. 60

Removing Polymer Pollutants From Effluent Water ................. 61

Rational System for Neutralizing Liquid Wastes .................. 61

# ALKALOIDS

UDC 547.944.3:541.135

## ELECTROCHEMICAL EPIMERIZATION OF SOLASODINE ALKALOID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 19 Jan 81) pp 163-167

CHECHINA, O. N., ZHURINOV, M. Zh., ASLANOV, Kh. A. and ISHBAYEV, F.

[Abstract] 3α-Hydroxy epimer of solasodine was isolated from the products of solasodine electrolysis in $H_2SO_4$-MeOH solution. This compound was formed as a result of an anodic oxidation of solasodine followed by disproportionation of the hydroxy radicals formed. A mixture of 100 ml MeOH and 2.6 ml conc. $H_2SO_4$ was added to 8.26 g solasodine. Electrolysis was performed using a graphite anode with current density of $4A/dm^2$ and the temperature at 28°C. At the termination of this process the electrolyte was acidified with $H_2SO_4$, concentrated under vacuum to 25 cc and diluted with distilled water to 200 cc. From the insoluble precipitate $\Delta^5$-spirosolan-3-one (I) was isolated, m.p. 180-190°C. $\Delta^5$-Spirosolan-3 -ol (II) was obtained from the soluble moieity. The products were identified by means of IR, NMR, UV, X-ray and mass spectroscopy. Comparative analysis of physical properties are reported for I and II. Figures 2; references 5: 2 Russian, 3 Western.
[153-7813]

UDC 541.121.536.7

## PHASE EQUILIBRIUM DIAGRAM FOR URANIUM-PLUTONIUM-CARBON SYSTEM IN 1200-2430°C RANGE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 262, No 2, Jan 82
(manuscript received 20 Mar 81) pp 382-386

UDOVSKIY, A. L. and ALEKSEYEVA, Z. M., Institute of Metallurgy imeni
A. A. Baykov, USSR Academy of Sciences, Moscow

[Abstract] It is necessary to know the phasic structural diagram (SD) of U-Pu-C systems for optimum choice of alloys in uranium-plutonium carbide fuel and use thereof in atomic reactors; previous studies have not identified such diagrams definitively, even for other temperature ranges. This study was based on experimental data obtained for the SD of such systems in the range of 1200-2430°. The authors succeeded for the first time to plot the isothermic cross-sections for 13 temperatures in this range; they also demonstrated the temperature evolution of phasic peaks of 3-phase tie lines, the diagrams of monovariant and nonvariant equilibriums in the U-Pu-C system. It is possible to calculate the changes in alloy properties at SD phase boundaries, compressibility, coefficient of thermal expansion, index of mutual diffusion of constituents, partial enthalpy and entropy of components, heat capacity, associated with one type of phase changes, as well as changes in heat with another type of phase transitions, on the basis of knowledge of SD and thermodynamic properties of alloys. Figures 4; references 15: 4 Russian, 11 Western.
[116-10,657]

UDC 546.65:541.49

## ANALYTICAL APPLICATION OF CERIUM COMPLEXES WITH ORGANOPHOSPHORUS COMPOUNDS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 1, Jan 82
(manuscript received 14 Oct 80) pp 32-34

KIRILLOV, A. I., TURKINA, L. A., BRAGINA, O. A. and MAMAYEVA, Ye. D.,
Irkutsk State University imeni A. A. Zhdanov

[Abstract] The goal of the present study was to increase the sensitivity of an analytical method for the determination of cerium. The following complexing agents were tried: β-phenylvinylphosphonic acid, β-(4-nitro)-phenylvinylphosphonic acid, β-phenoxyvinylphosphonic acid, poly-β-phenoxyvinylphosphonic acid and a copolymer of β-phenoxyvinylphosphonic acid with vinylphenyl ester (I). The most promising agent was I which, used at a four fold excess, formed a water soluble complex with cerium at pH 12, with an absorption maximum at 322 nm ($\varepsilon = 3.6 \times 10^3$). The complex consisted of a 1:2 ratio of Ce:I. It was shown that at pH 12 $Ce^{III}$ is oxidized to $Ce^{IV}$. Lower detection limit in this method is 0.19 μg/ml Ce. Even a 10-fold excess of rare earth elements did not interfere with this determination. Figure 1; references: 7 Russian.
[134-7813]

---

## USE OF PETROLEUM SULFOXIDES IN EXTRACTION-POLAROGRAPHIC DETERMINATION OF URANIUM

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 1, Jan 82
(manuscript received 11 Dec 80) pp 52-54

MAISTRENKO, V. N., MURINOV, Yu. I., REZNIK, L. B., AMIRKHANOVA, F. A. and NIKITIN, Yu. Ye., Bashkir State University imeni 40th Anniversary of October; and Institute of Chemistry, Bashkir Branch of USSR Academy of Sciences, Ufa

[Abstract] A feasibility study was carried out for polarographic determination of U(VI) extracted from aqueous solutions by means of petroleum sulfoxides (PSO) mixed with organic solvents (toluene, benzene and m-xylene). Optimal concentration of PSO was determined to be 1-4 M, when practically quantitative extraction of uranium was achieved, free of any admixtures (Ti, Zr, Hf, Th, La and rare earth elements). The sensitivity of this method is 3 μg/ml of U(VI). Using oscillographic polarography, uranium content of 0.6 μg/ml could be determined. These results were based on analysis of synthetic mixtures. Figure 1; references 4: 2 Russian, 2 Western.
[134-7813]

## DETERMINATION OF FLUORINE IN URANIUM AND ITS COMPOUNDS BY MEANS OF FLUORO-SELECTIVE ELECTRODE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 1, Jan 82
(manuscript received 17 Dec 80) pp [illegible]

PRIVALOVA, M. M., TULINA, M. D., [illegible], D. S. and [illegible], L. F.,
Physics and Energy Institute, Obninsk

[Abstract] The ability to determine fluorides by means of a fluoro-selective electrode without the necessity for preliminary separation of the uranium admixtures was investigated. The effect of U(VI) on the potential of the fluoro-selective electrode was minimized by introduction of a masking agent in the presence of a neutral buffer solution. $H_2O_2$ was shown to be a satisfactory masking agent for U(VI). It was capable of preserving optimal pH value for the process and along with it, good reproducibility of results. The use of $H_2O_2$ prevented a shift of the potential caused usually by presence of U(VI) and it assured oxidation of U(IV). In the fluorine concentration range of [illegible]$\times 10^{-2}$ - $5\times 10^{-1}$%, a 2M $H_2O_2$ should be used; at lower concentrations, the use of 1-2 M $H_2O_2$ was suggested. Lower limit for the detection of fluorine is $5\times 10^{-6}$M or $5\times 10^{-3}$%. This direct potentiometric method is preferable to others because it is not affected by the presence of $SO_4^=$, $Cl^-$, $NO_3^-$, $HPO_4^=$ ions, nor by many metallic ions and oxidizers. This method is applicable to uranium proper, its oxides and salts as well as to other uranium-containing technological solutions. Figure 1; references 22: 12 Russian (one by a Bulgarian author), 10 Western.
[134-7813]

---

UDC 543.42:546.215:546.183

## SPECTROPHOTOMETRIC DETERMINATION OF PEROXIDE COMPOUNDS IN PRESENCE OF PHOSPHINATE AND PHOSPHONATE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 1, Jan 82
(manuscript received 4 Dec 80) pp 77-79

BURKITBAYEV, M., MURATBEKOV, M. B. and [illegible], B. A., Kazakh State
University imeni S. M. Kirov, Alma-Ata

[Abstract] The feasibility of using iron (II) to determine peroxide compounds in presence of large excess of phosphonate (I) or phosphinate (II) was investigated. To evaluate the nature of I and II interference in the determination of peroxides, absorption spectra of Fe (III) and Fe(II) solutions and their complexes with I and II were determined. To avoid this interference, the absorption of Fe(III) should be measured against a control solution

containing the same quantitites of Fe(II) and $H_3PO_3$ as in the test solution. When this method was compared with data from spectrophotometric determination of $I_3^-$, the results were found to be in good agreement. This method then could be used for determination of peroxides even in presence of 10+ excess of phosphonates or phosphinates. Figure 1, references: 2 Western.
[134-[illegible]]

UDC: 612.396.21:543.54

## N-ARYLGLYCOSYL AMINES, PART 3: QUANTITATIVE GAS CHROMATOGRAPHIC ANALYSIS OF α AND β ANOMERS OF SOME N-ARYLGLYCOSYL AMINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81 (manuscript received 10 Dec 80) pp 2793-2796

KALININA, N. I., BEZZUBOV, A. A. and STEPANENKO, B. N., Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences, Moscow

[Abstract] Reference is made to the authors' previous work on identification and quantitative gas chromatographic analysis of N-arylglycosyl amines, for the purpose of identifying the anomer structure of these amines, which are important biological compounds. The possibility of using gas chromatography to separate and analyze mixtures of α and β anomers of these amines was tested for. Synthesis of N-arylglycosyl amines with α and β configuration of the anomer center is described and formula provided; α and β anomers of N-o,m,p-nitrophenyl glycosylamines were also synthesized. The constants of these anomers are tabulated and quantities of N-m-nitrophenyl-D-xylosylamine and N-m-nitrophenyl-D-glycosylamine α and β anomers demonstrated by gas chromatography are listed, thus confirming the feasibility of using this technique for quantitative analysis of these two anomers of the last mentioned amines. However, galactosylamines, anomers of N-o- and -p-nitrophenylglycosyl, xylosyl and galactosyl amines could not be separated. References 9: 6 Russian, 3 Western.
[[illegible]]

UDC: 546.86'185:55.074.7

## SPECTROSCOPIC STUDY OF STRUCTURE OF SILICON ANTIMONATE AND PHOSPHOSILICON ANTIMONATE CATION EXCHANGERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 12, Dec 81
(manuscript received 20 Mar 80) pp [illegible]

[illegible], R. A., [illegible], N. P. and KOVALENKO, M. A.

[Abstract] Silicon and phosphosilicon antimonate cation exchangers (SAC and PSAC) in crystalline and amorphous form were submitted to heat treatment and studies of infrared spectra (Perkin Elmer 225 spectrophotometer). Determination was made of parameters of relative intensities of absorption bands of antimonate cation exchangers, parameters of crystallinity, infrared spectra of SAC and PSAC. The crystalline forms contained Sb-OH and $H_3O^+$ groups and heat resistance of antimonates (105° for 12 h) was stabilized by the presence of silicon. It was demonstrated that examination of infrared spectra is effective for tentative evaluation of composition and crystallinity of pyrochloric phases of SAC and PSAC. Figures 4; references 9: 7 Russian, 2 Western.
[[illegible],657]

UDC 541.15:547.56:547.681

## EFFECT OF PHENOLS ON RADIATION-INITIATED OXIDATION OF BENZ(A)PYRENE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 1, Jan 82
(manuscript received 7 Apr 80) pp 181-18[illegible]

[illegible], Kh. M. and [illegible], [illegible], Institute of Chemistry,
[illegible] Academy of Sciences

[Abstract] The kinetics and basic products of oxidizing radiolysis of carcinogenic benz(a)pyrene in the presence of phenol were studied to determine possibilities of this approach to eliminating this substance from the environment. A second aspect was to study similarities or the lack of kinetic principles in using phenol in oxidizing radiolysis and biological oxidation of benz(a)pyrene. Toxicological tests with hairless mice and rat embryo fibroblasts showed that the radiolysis using phenol and the metabolic breakdown of the carcinogen were very similar, but the phenol radiolysis significantly reduced the toxicity of the reacting mixture. Similar results were obtained using methylresorcin instead of phenol. Increased hydroxylation and alkylation of the benz(a)pyrene molecule was noted. Figures [illegible]; references 14: 9 Russian, 5 English.
[[illegible]-12131]

UDC 661.631.2

## ISOLATING IMPURITIES FROM YELLOW PHOSPHORUS WITH ETHYL ALCOHOL

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 1, Jan 82
(manuscript received [illegible] May 80) pp 192-193

NIKANDROV, I. S. and KOGTEV, S. Ye., Dzerzhinsk Branch,
Gor'kiy Polytechnic Institute

[Abstract] Ethanol and phosphorus were mixed in a 1:1 ratio at 60°C for [illegible] minutes, with impurities being determined before and after the process using benzene-pyridine mixture. Chemically pure solvents were obtained by [illegible] distillation. The basic impurities diphenyl, acenaphthene and diphenylene oxide were [illegible]-95% eliminated, while chrysene, 1,2-benzanthracene and [illegible] were about [illegible] removed. References: 3 Russian.
[illegible]

UDC 547.562.3:542.61

## EXTRACTING HALOGEN PHENOLS FROM WATER WITH SIMPLE AND COMPLEX ESTERS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 1, Jan 82
(manuscript received [illegible] May 80) pp 226-228

KORENMAN, Ya. I., [illegible], N. N. and BOROVIK, O. A.,
Voronezh Technological Institute

[Abstract] Extraction of highly toxic monohalogen phenols using alkylacetates has been described earlier. The effectiveness of simple and complex esters is now compared, and results indicate that complex esters such as acetic acid esters (butylacetate-hexylacetate) and simple diamyl and didecyl esters are more effective as the number of carbon atoms in the extractant increases. Isomerism of the compounds used also affects extraction, in a [illegible] ortho-effect. While less effective for complete extraction of halogen phenols than butylacetate, diamyl ester has the advantages of near insolubility in water, lesser toxicity, and economy. References 8: 6 Russian, 2 English.
[illegible]

UDC 577.154

## MICROBIOLOGICAL SYNTHESIS OF 3-HYDROXY-7-BROMO-(2-CHLOROPHENYL)-1,2-DIHYDRO-3H-1,4-BENZDIAZEPINE-2-ONE BY IMMOBILIZED ACTINOMYCETES

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 6, Nov-Dec 81
(manuscript received 29 Jul 81) pp 779-781

PAVLENKO, T. I. and ZABOLOTSKAYA, N. N., Physicochemical Institute,
UkrSSR Academy of Sciences, Odessa

[Abstract] Microbiological synthesis by 3-hydroxy-derivatives of phenazepam using immobilized Actinomyces roseochromogenes, "VKM A-612" and Streptomyces viridis, "VKM A-627" were studied. Since yields were best for actinomycetes immobilized on polyvinyl alcohol, forced aeration of this medium was used to increase that yield. Next, the polyvinyl alcohol was used in conjunction with a co-substrate of 3-methyl-7-bromo-5-(2-chlorophenyl)-1,2,dihydro-3H-1,4 benzdiazepine-2-one. Hydroxylation was possible 3 times on the same sample, with final activity reduced by 30%. Microbiological synthesis with a 15% yield of 3-hydroxyphenazepam indicated good prospects for using this method over one involving microsome fractions. Details of the procedures are given in an experimental section. References 4: 3 Russian, 1 English.
[144-12131]

# CATALYSIS

UDC: 547.28:669.094.3

## INFLUENCE OF COBALT NAPHTHENATE ON FORMATION OF SOME PRODUCTS OF OXIDATIVE DESTRUCTION OF CYCLOHEXANE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 12, Dec 81
(manuscript received 20 Jun 80) pp 2733-2739

FREYDIN, B. G. and PERKEL', A. L.

[Abstract] Previous studies having demonstrated formation of adipic anhydride as one of the main products of dstruction of C-C bonds in uncatalyzed oxidation of cyclohexane, cyclohexanone and 2-hydroxycyclohexanone, it was interesting to examine the catalytic oxidation of the last two compounds in the presence of the most common catalyst, cobalt naphthenate. Kinetic curves of noncatalyzed and catalyzed oxidation of 2-hydroxycyclohexanone by air and oxygen at 50° in chlorobenzene are illustrated, as well as formation of some products of oxidation of cyclohexane with and without cobalt naphthenate as a catalyst. The products of dissociation were peroxides, $H_2O_2$, monoperadipic acid, 1,2-cyclohexandione, adipic anhydride, adipic acid and monoaldehyde of adipic acid, whose yield before breakdown with and without catalyst is tabulated. Use of the above catalyst reduced the yield of adipic anhydride and increase that of adipic acid, which is explained by two directions of dissociation: radical and ionic. The reduced yield of esters is due to formation of an anhydride by depression of the direction of oxidative destruction. Figures 2; references 10: 7 Russian, 3 Western.
[110-10,657]

UDC: 547.391.1.546.98

# CARBONYLATION OF ACETYLENE IN PALLADIUM (II) BROMIDE AND SULFONATE SOLUTIONS IN PRESENCE OF TRIPHENYLPHOSPHITE AND p-TOLUENESULFONIC ACID

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 12, Dec 81
(manuscript received 15 Apr 80) pp 2739-2743

[illegible], L. M., IL'INA, L. A. and TEMKIN, O. N., Saratov Branch,
Scientific Research Institute of Chemistry and Technology of Polymers
imeni Academician V. A. Kargin

[Abstract] A study was made of the effect of p-toluenesulfonic acid (p-TSA) on complexes of bromide and palladium sulfonate with triphenylphosphite in carbonylation of acetylene to check the assumption that substitution of HBr with any other acid less apt to interact with n-butyl alcohol would enhance catalyst stability and extend the period of service. A gas-flux reactor was used and reaction gas analyzed, before and after the reactor, on an LKhM-8D chromatograph with heat conduction detector and activated carbon as sorbent. The kinetics of CO and $C_2H_2$ absorption with different concentrations of p-TSA and HBr, productivity of catalyst as a function of p-TSA concentration and rate of absorption of gases as a function of concentration of triphenylphosphite are illustrated. The catalytic system based on palladium sulfonate was highly selective for butyl acrylate synthesis but demonstrated low activity, and replacement of HBr with p-TSA did not improve catalystic stability. The mechanisms of these findings are discussed. Figures 3; references: 7 Russian.
[110-12,657]

## CAPROLACTAM PLANT REACHES OUTPUT CAPACITY

Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 81 p 2

[Article: "Chemists of Chirchik Keep Their Promise"]

[Text] A caprolactam complex of the Chirchik "Elektrokhimprom" Production Association (Tashkentskaya Oblast) has achieved its planned capacity. The daily output of this valuable chemical raw material has crossed the 200 ton line.

The enterprise's products, which are used as raw material in the manufacture of synthetic fiber, nonwoven materials, carpets and tire cord, are sent to many addresses.

11004
CSO: 1841/151

# NEW PLASTICS PLANT ENJOYS EARLY SUCCESS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Feb 82 p 2

[Article by chemical engineer A. Pal'chin: "Among the Leaders From the First Steps"]

[Text] The Shevchenko Plastics Plant went into operation in May 1981, and the State Seal of Quality was awarded to one of its important products, styrene, as early as on 31 December. A solemn meeting held 18 January 1982 was devoted to this event.

And just a few days later directors from kindred enterprises of "Soyuzkhimplast" held a conference here. Despite the fact that the Shevchenko Plastics Plant is one of the youngest in the country, it already has something to share with others: It has accumulated valuable experience in assimilating the country's largest output capacities in complex climatic conditions.

Typically, all processes in the shops are automated and mechanized at the highest level; there is practially no manual labor.

11004
CSO: 1841/151

# COAL GASIFICATION

## SYNFUEL FACILITY UNDER CONSTRUCTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Feb 82 p 2

[Article by I. Aryasov: "Gasoline From Coal"]

[Text] ST-5 is the name given to an experimental industrial facility for obtaining synthetic fuel from brown coal. It is being built at the "Bel'kovskaya" mine of the "Novomoskovskugol'" Production Association. The ST-5 is a prototype of enterprises which will be using coal from the Kuybyshev Motor-Tractor Electrical Equipment and Carbureter Plant as raw material.

11004
CSO: 1841/151

## DETONATION

UDC 532.529

### CALCULATING HETEROGENEOUS DETONATION OF LIQUID FUEL MONODISPERSION AIR SUSPENSION INCLUDING IGNITION RETARDATION

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 1, Jan 82
(manuscript received 13 Jul 81) pp 125-126

FR[illegible], [illegible] I. and VLASOV, D. A.

[Abstract] Detonation of liquid fuel vapors brings intensive energy discharge as liquid fuel droplets burn behind a shock wave. This study sought to determine physicochemical properties of the fuel, shock wave parameters, and the potential equilibrium between the heterogeneous detonation front and the trailing zone of chemical reactions. Calculations are presented for a theoretical model, and the process of progressive vaporization and energy release is described. Ignition can be retarded by altering the internal molecular structure of the fuel, which changes the width of the chemical reaction zone and redistributes other parameters in the heterogeneous detonation wave. Figure 1; references: 6 Russian.
[14[illegible]-12131]

# FERTILIZERS

## PHOSPHATE PRODUCTION SUFFERS FROM INDECISIVE POLICIES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Mar 82 p 2

[Article by Candidate of Economic Sciences G. Zagoruyko, director, Division of Chemical Industry, Dzhambulskaya Oblast Committee of the Kazakh SSR Communist Party: "The Test of Experience"]

[Text] The Karatau-Dzhambul territorial production complex has important significance to the national economy. Its main field of specialization is phosphorite industry. In terms of unionwide division of labor the complex provides all of the commercial phosphorite ore for electrothermal conversion, more than half of the feed additives, and together with the Chimkent "Fosfor" Production Association it produces almost 90 percent of the country's yellow phosphorus. This is the sole region in Kazakhstan producing fine-ground phosphorite ore and defluorinated feed phosphates.

The complex's industry is based mainly at one of our country's largest, and we might say unique, phosphorite deposits in the Karatau basin.

Development of the Karatau basin began back during the war. As long as the sector contained one or two small enterprises, things hummed right along. Throughout their development, they surpassed the planning targets. The growth rate of the principal indicators practically tripled from one five-year plan to the next. But as production increased, the tasks became more complex. The 10th Five-Year Plan demonstrated that unless fundamental measures were implemented, intensive development of the sector would be impossible.

Judge for yourself. More than 715 million rubles of capital investments were assimilated by facilities of the region's phosphorus industry during the 10th Five-Year Plan. Much was done to provide social, cultural and personal facilities to support the chemists, miners and builders. It would be sufficient to point out that the number of personnel involved in industrial production at just the chemical enterprises alone increased by a time and a half. Meanwhile the sector's labor productivity dropped almost 33 percent in 1980 compared with 1975, while commercial production remained at its previous level. The output of yellow phosphorus and mineral fertilizers decreased. The output-capital ratio dropped by a factor of two. Instead of profits, the region's chemical industry began coming up with losses in the millions. By the beginning of the 11th Five-Year Plan the availability of personnel became even worse not only at new enterprises but also ones already operating.

An analysis of these unfavorable phenomena showed that many of the woes are connected with slow utilization of internal reserves and with insufficient organizational work. We have already done much in this aspect, and at some enterprises that were formerly behind we managed to significantly correct things in the first year of the new five-year plan. Miners and concentration plant workers of Karatau and Zhanatas began to work better, and the output of yellow phosphorus and mineral fertilizers increased.

The successes delight us, but they do not delude us. Moreover we are firmly confident that were the scientific research and planning organizations and the Ministry of Mineral Fertilizer Production to heed the opinions and proposals of the producers more often, things could be improved fundamentally.

Karatau phosphorites are unique also in the difficulties associated with their processing. It is clear to everyone today that the extent to which the capacities of phosphorus plants are utilized--50-55 percent today--depends directly on the quality of the raw material. As the basin's largest Zhanatas deposit develops, as new areas are brought into the mining effort and as the front of mining operations deepens, the composition of the commercial phosphorites grows more complex. This material is now represented by three to four times more different lithological formations with different physicomechanical properties.

Electrothermal kilns using this ore do not produce the expected payoff. Raw material with particular industrial properties must be subjected to deep thermal preparation. This is now the main problem. It was raised more than 10 years ago in the Ministry of Chemical Industry and in the All-Union "Soyuzfosfor" Association, and then in the newly created Ministry of Mineral Fertilizer Production.

In May of last year a decision was made with the participation of First Deputy Minister of Mineral Fertilizer Production V. Koval' to use the pelletizing method in thermal preparation of the raw material. A special government decree was published in response to the ministry's proposal for introducing output capacities capable of producing 2 million tons of pellets per year.

But the debate as to the best way to prepare the raw material--by pelletizing, agglomeration or, to keep things simple, continue working in the old way, with crude ore--still continues today.

It should be stated that these disagreements between specialists do have substantial grounds. The experience of two Dznambul phosphorus plants, of which one works with crude ore and the other works with agglomerate, argues not in favor of the latter. True, the output capacities are being used identically poorly. But the yellow phosphorus obtained from agglomerate is almost twice as expensive. It is difficult to say anything conclusive about pellets on the basis of the hasty tests run with the 48-megawatt kilns in Tol'yatti.

Colleagues of the LenNIIgiprokhim [not further identified] are stubbornly pushing for agglomeration, though they suggest absolutely no arguments of any significance. Their reasoning is based more on a fear of losing face than on common sense: The plan for the agglomeration operation at the Novodzhambulsk Phosphorus Plant was based on a plan for an agglomeration factory at the Lipetsk Metallurgical Plant, drawn up 20 years previously. This already ancient plant was adopted as it stood without regard to the experience of operating the equipment at other plants of the USSR Ministry of Ferrous Metallurgy, without regard to the specific features of the raw material and without proper scientific basis and research on this highly complex issue. The result is obvious. We can see today that without significant reconstruction, this operation will not be able to produce agglomerate of the required quality or the planned quantity.

However, throughout the entire 10th Five-Year Plan colleagues of the LenNIIgiprokhim continued to work with remarkable stubbornness on plans for a new agglomeration operation in the Dzhambul "Khimprom" Production Association, and they included its construction into the draft for the new five-year plan at an estimated cost of 150 million rubles.

Is this a suitable thing to do? After all, this method has not enjoyed broad use in Soviet ferrous metallurgical practice and in world phosphorus practice due to its high cost in comparison with pelletizing. In the opinion of phosphorus producers agglomeration is unpromising as a means of preparing ore from the Zhanatas deposit. Moreover the agglomerate is ill-suited to shipping due to its strength properties, and construction of agglomeration factories at all plants rather than at the place where the ore is mined would mean a noticeable increase in capital outlays.

Workers of the "Karatau" Association ran some tests 10 years back on pelletizing Zhanatas ore at the Sokolovsko-Sarbayskiy Mining and Concentration Combine and at the experimental factory of Krivoy Rog's "Mekhanobrchermet." The technical know-how is present, and the tested samples retain outstanding qualities. However, the experiments showed something else as well: Not all commercial phosphorite raw material is suited to this. Karatau phosphorite once again reveals its "difficult nature." This confirms once again that we cannot thoughtlessly bounce from one idea to the next. Each idea requires the test of experience. And all proponents of pellets agree with this. But the way things actually stand, we will have to assimilate millions in capital investments at this same factory for pellet production this year.

Pellet acquisition is much more complex than agglomeration, and naturally it is more expensive. Prior to making a final decision on construction of a pellet production complex, the Ministry of Mineral Fertilizer Production should have analyzed the possibilities of the raw material base, the existing production equipment and the additional outlays at phosphorus plants associated with the receipt and handling of pellets more carefully.

The first problem, preparing the raw materials, is complicated by another--insufficient knowledge of the industrial properties of Karatau ore and the general absence of the parameters required for determination of these properties. The "LenNIIgiprokhim" and the State Scientific Research Institute of Mined Chemical Raw Materials were assigned by the Ministry of Chemical Industry to determine the indicators for [illegible] qualities of the raw material 10 years ago. This was followed by [illegible] orders. As of January 1 of this year three new all-union standards went into effect in place of the formerly existing technical specifications on commercial phosphorites from Karatau. Naturally they do foresee additional limitations on the quality of commercial ore, which requires review and reduction of the availability of phosphorites, and additional outlays that had not been considered in the new wholesale prices on the finished product. But no one will tell us how justified all of this is from a scientific standpoint.

Unfortunately, such experiments were conducted four times in the last 3 years, but inasmuch as none of them ever had a firm scientific basis, they did not lead to any noticeable improvements in the work of the kilns. What they did do was cause significant deviations from the plan for mining production, and decrease the existing capacities of the mines by 1.5-2 times.

This policy cannot be said to be correct. Why must the mining enterprise pay for the mistakes made in selection, planning and incorporation of the processes to be used in phosphorus production? In addition to this, the mining operations are being conducted haphazardly, for practicaly purposes without a plan, since the latter has had to be revised several times already in the last few years.

The main planning institute of the "Karatau" Association, the State All-Union Institute for the Planning of Chemical Raw Material Mining Industry Enterprises, seems to be spending its time on nothing other than plan corrections, so as to bring the plan into correspondence with the actual state of the mining operations. As a result stripping operations have yet to be started in the quarries of the Zhanatas mining administration. Moreover, reserves that have been stripped and prepared for mining are three to five times below standard. Thus selective ore extraction has resulted in the fact that the largest deposit in the basin--Zhanatas--is being worked in violation of all existing laws on subsoil conservation and sensible use of natural resources.

The time has come to rise from idle debates and discussion to concrete work.

11004
CSO: 1841/151

UDC: 546.39.227:546.39.185:541.123.31

## $(NH_4)_2S_2O_8$--$(NH_4)_2HPO_4$--$H_2O$ SYSTEM

[illegible] ZHURNAL in Russian Vol 48, No 1, Jan 82
[illegible]

[illegible], A. [illegible], A. N., Institute of Physical Chemistry,
[illegible] Academy of Sciences

[Abstract] The above 3-component system was studied to test the effect of [illegible] on solubility of diammonium phosphate. Solubility was [illegible] polythermal method that permits determination of crystal[illegible]. [illegible]ium persulfate and diammonium phosphate were [illegible] chemically pure or analytical grade reagents. Twelve [illegible] this triple system and their polytherms are illus[illegible] solubility in the $(NH_4)_2S_2O_8$--$(NH_4)_2HPO_4$--$H_2O$ system [illegible] of liquid phase and bottom phase at tempera[illegible]. Figures 2; references 8: 7 Russian, 1 Western.
[illegible]

UDC: 631.851:631.821

## [illegible] AND PHOSPHATE CONTENT OF SODDY PODZOLIC SOIL [illegible] OF LIME

[illegible] No 1, Jan 82 (manuscript received 11 Feb 81)

[illegible], [illegible] and SHIL'NIKOV, I. A., All-Union Scientific [illegible] Fertilizers and Soil Science, Moscow

[illegible] and phosphorus fertilizers are important to the area [illegible] region of RSFSR where most of the soddy podzolic soil has [illegible] phosphorus content. A long-term field experi[illegible] conducted in 1966-1979 at the Central Experimental [illegible] Scientific Research Institute of Fertilizers and Soil [illegible] fields with soddy podzolic clayey loam, where [illegible], and a five-field crop rotation was used: vicia-[illegible], potatoes and barley. Phosphorite meal was com[illegible] superphosphate in acid and lime soil with the use of [illegible] fertilizers. [illegible] doses of lime treatment did not diminish [illegible]. A study was also made of the elements of [illegible] between [illegible] and soil: dissolution of calcium phosphates by [illegible] and absorption by soil of decomposition products. [illegible] meal was determined by its uneven distribution

in the plowing layer, i.e., heterogeneity of soil, rather than dosage of applied lime. Phosphate content of lime-treated soil fertilized with phosphorite meal depended mainly on the reaction of soil, since about the same amounts of decomposed phosphorite meal were found in acid and limed soil. References: [illegible] Russian.
[[illegible]]

UDC 631.85:631.445.51:631.587

EFFECT AND RESIDUAL INFLUENCE OF PHOSPHORUS FERTILIZERS ON IRRIGATED [illegible] SOIL: REPORT 1

Moscow AGROKHIMIYA in Russian No 4, Apr 81 (manuscript received 18 Feb 81)

[illegible]

[illegible], F. N., All-Union Scientific Research Institute of Fertilizers and [illegible], Moscow

[Abstract] [illegible] together with the [illegible] Experimental Land [illegible] Station on [illegible], calcareous clayey loam soil during irrigation in [illegible]. The [illegible] optimum levels of loose [illegible] for annual [illegible] involved the use of [illegible] the standard doses for annual [illegible], with two different levels of N ([illegible] kg/ha and [illegible] kg/ha + [illegible]) in the first year and varying doses thereafter for different crops--winter barley, winter wheat, later summer corn, corn raised for [illegible], as well as winter barley mixed with alfalfa. It was found that the [illegible] of the phosphorus fertilizers differed appreciably, [illegible] of phosphorus applied in the first 5 years, best [illegible] obtained when the natural phosphorus level was low and that, [illegible] the higher standard doses of phosphorus fertilizer [illegible] was high, [illegible] the standard amounts of [illegible] superphosphate [illegible] were applied in two different periods, as compared to application [illegible] the first [illegible] years of a comparable dose of phosphorus. It was also [illegible] maintenance doses of phosphorus at the early stages. A [illegible] was demonstrated between harvest and efficacy of phosphorus fertilizers, on the one hand, and amount of loose phosphorus soil, on the other. References: [illegible] Russian.
[[illegible]]

UDC: 631.85:631.445.24

## EFFECTS, RESIDUAL INFLUENCE AND CUMULATIVE EFFICACY OF PHOSPHORUS FERTILIZERS IN SODDY PODZOLIC SOIL

[illegible] in Russian No 1, Jan 82 (manuscript received 12 Nov 80)
[illegible]

[illegible]NIN, A. T. and YANISHEVSKIY, F. V., Scientific Institute of Fertilizers, Insecticides and Fungicides imeni Prof Ya. V. Samoylov, Moscow

[Abstract] Field experiments were conducted on the clayey loam soddy podzolic soil of the Dolgoprudnyy Agrochemical Experimental Station and sandy loam soddy podzolic soil of Ramenskoye Agrochemical Experimental Station (both stations in Moscow Oblast), using three-field crop rotation to grow [illegible] and oats, winter wheat and potatoes simultaneously (1975-1979). Phosphates were applied in a dosage of 60 kg $P_2O_5$/ha with an optimum nitrogen and potassium background ([illegible]K90 for potatoes, N90 for winter wheat). Determination was made of effects of annual application of P60, direct effect, first aftereffect, second aftereffect and cumulative effect thereof, and the cumulative effect [illegible] found to be much better on the clayey loam soil than sandy loam. In most cases harvests increased on both types of soil with annual application [illegible], and there was a rather strong aftereffect in the first year, [illegible] the second. It was indicated that it is imperative to search for new methods and plans for field experiments that would permit evaluation of [illegible] phosphates with fresh applications of phosphorus, [illegible] quantitatively at the present time. References: [illegible]

[illegible]

UDC: 631.82:577.47

## [illegible] THE ENVIRONMENT

[illegible] in Russian No 1, Jan 82 pp 121-133

[illegible], [illegible], [illegible]VA, [illegible] V. and KHLYSTOVA, A. F.

[Abstract] [illegible] survey of the impact of mineral fertilizers on the [illegible] basis of reports referable to different countries covering [illegible] 1961-1981 (Netherlands, Japan, FRG, GDR, USSR, United States, [illegible]), in view of the increasing use of such fertilizers (38.4 million tons in 1961-1966, 99.4 million tons in 1977-1978 and a projection of 132.4 million [illegible]-1983 and over 300 million tons in the year 2000. Along with the [illegible] effects of NPK fertilizers they affect the environment adversely if

[illegible] doses are employed, when there are violations of the rules for transportation, storage mixing, and when the physicochemical and mechanical properties of fertilizers are violated. Research is currently in progress in many of the countries using large doses of mineral fertilizers to determine extent of immobilization or leaching out of nutrients from soil (which means that more have to be applied), impairment of soil nitrogen balance because of increasing application of N fertilizers, pollution of water by nitrates which have been linked to stomach cancer, poisoning of cattle; studies have also been made of phosphorus levels in water. Large doses of fertilizers disrupt the balance of trace and macro-elements in soil and assimilation thereof by plants. Means of preventing the environmental hazard of fluorine contained in phosphorus fertilizers are discussed: use of optimum doses of fertilizers, implementation of erosion-preventing measures, fertilizers should not be applied to frozen soil, recommended irrigation norms should not be exceeded, nitrate fertilizers to be applied only in the spring, use of nitrification inhibitors to prevent loss of nutrients from a [illegible] soil, use of slow-acting fertilizers, strict adherence to proper procedures for raising different crops. Medical and health services of different countries are working on setting standards for permissible concentrations of toxic agents in air and water. References 163: 49 Russian, 114 Western.
[illegible]

UDC 546.185:541.17

## [illegible] TRIPOLYPHOSPHATES AS [illegible] AGENTS OF GRANULATED FERTILIZERS

[illegible], No 1 Jan 82
([illegible])

[illegible], L. A. and [illegible] Lensovet; and Institute of General and Inorganic Chemistry, Belorussian SSR Academy of Sciences]

[Abstract] Binary tripolyphosphates [illegible] and $KCa_2P_3O_{10}\cdot 4H_2O$ were dissolved and combined with potassium chloride until the ratio $Ca^{2+}$: [illegible] was obtained. The precipitate was washed and air-dried, then comparative analysis of the rate of dissolving in water was compared with commercial nitro-ammo-phosphoric fertilizers. The conductometric curves of test and control samples showed that the [illegible] 1.3 times slower, and the [illegible] times slower, than the commercial fertilizer. The tripolyphosphate coating of the granules was found effective in lengthening the effective period of the nitro-ammo-phosphorus without any undesirable side effects. Field tests showed that fine dispersed powder was the best form for application. Figure 1; references 9: 6 Russian, 3 English.
[illegible]

UDC 546.171.1'185:541.17

## AMMONIUM TRIPOLYPHOSPHATE $(NH_4)_5P_3O_{10}$

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 1, Jan 82
(manuscript received [illegible] Apr 80) pp 142-147

[illegible], V. A., PRODAN, Ye. A. and PETROVSKAYA, L. I., Institute of General and Inorganic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] A study is reported on the effects of water vapor and temperature on topochemical transformations $(NH_4)_5P_3O_{10}\cdot 2H_2O \rightarrow (NH_4)_5P_3O_{10}\cdot H_2O \rightarrow (NH_4)_5P_3O_{10}$. A chromatographically pure, fine-crystal dihydrate was dried and its X-ray characteristics determined. Then it was frozen, subjected to vacuum and water vapor was introduced as it was thawed. A quartz microbalance was used to monitor the sample's weight, while vapor was held at a constant. At water pressure of [illegible] mm and temperatures less than 60-70°C the dihydrate lost half the crystallized water, becoming a crystallized monohydrate without anion destruction. Above that temperature range the remaining water was released with simultaneous cation and anion destruction and formation of more condensed phosphates. It was necessary to use gaseous ammonia, which increased the cation's heat stability, in order to fully eliminate crystallized water and preserve the tripolyphosphate chain. At low pressures it was possible to obtain an anhydrous ammonium tripolyphosphate using iso- and non-isothermic thermal treatment procedures for $(NH_4)_5P_3O_{10}\cdot 2H_2O$. At high pressure, supplementary thermal processing in a gaseous ammonia atmosphere was required. Figures [illegible]; references 3: 1 Russian, 2 English.
[illegible]

UDC 541.572.54:547.898

## [illegible] MACROHETEROCYCLIC SYSTEMS WITH HIGH DEGREE OF CONJUGATION (REVIEW)

[illegible] in Russian No 1, Jan 82 (manuscript received 12 [illegible] 81) pp 3-10

[illegible], V. N., All-Union Scientific Research Institute of Chemical Reagents and Ultrapure Chemical Compounds, Moscow

[Abstract] This review-type article covers the following subtopics: classification and coding of highly conjugated macroheterocyclic systems containing nitrogen atoms; synthesis of these compounds; synthesis of di- and polymacroheterocyclic systems; reactions of macroheterocyclic compounds and their utilization as models of important biological systems, chelates, dyes, etc. The coding system takes into consideration the number of units in the macroheterocyclic contour, the number of nitrogen atoms and their sequence. Basically, there are three general synthetic approaches to these systems: building of the macroheterocyclic contour, conversion of an already formed system to increase the conjugation and restructuring of heterocyclic compounds into macroheterocyclic ones. [illegible] are capable of undergoing [illegible] reactions. References 132: 19 Russian (all but 2 by the author of this review, [illegible]...
[illegible]-7813]

UDC: 547.13

## REACTION OF ARENOSULFO ACID AZIDES WITH TRIALKYL STIBINES AND TRIALKYL STIBITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81 (manuscript received 20 Feb 81) pp [illegible]

[illegible], Z. T., [illegible], Sh. N. and PINCHUK, A. M.

[Abstract] In an ether solution, trialkyl stibines react with arenosulfo acid azides and yield trialkylstibazosulfonylarenes that were unknown heretofore.

They have some similarity to triphenyl stibazosulfonylarenes. The compounds were submitted to hydrolysis, yielding arenosulfamide, and to reactions with the following: anisaldehyde, hydrogen chloride, acetic acid, benzoic acid, 2,2,3,3,4,4,5,5-octafluoropentanol. stannous tetrabromide, stannous tetrachloride. Trialkyl stibazosulfonylarenes can be dissociated in the nitrogen-antimony body with the use of hydrogen chloride gas, carboxylic acids, fluoridated alcohol, anisaldehyde and stannous halides. Trialkyl stibites react with arenosulfo acid azides also, forming 1,3,5-triethoxy-2,4,6-triarenosulfonylcyclotristib(III) azan and pentaethoxy antimony. Chemical formulas of four trialkyl stibazosulfonylarenes, their melting points and molecular mass are provided. References 6: 5 Russian, 1 Western.
[108-10,657]

## ORGANOMETALLIC COMPOUNDS

UDC 541.67:546.742-382.547.241

# SYNTHESIS AND EXAMINATION OF Ni(II) COMPLEXES WITH UNSATURATED PHOSPHINE OXIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81
(manuscript received 9 Jan 81) pp 2654-[illegible]

MOLDAVSKAYA, T. A., PETROVA, G. G., SEDOVA, G. N., SKVORTSOV, N. K. and
REYKHSFEL'D, V. O., Leningrad Technological Institute imeni Lensovet

[Abstract] This work was pursued because of the importance of phosphoryl compounds as ligands forming numerous coordination compounds of the $ML_nX_m$ type with metal salts (X--anion, L--phosphorylic compound). Here, phosphine oxides with acetylene and allene radicals at the phosphorus atom were used for synthesis, as well as phosphoryl ligands, which had been previously used for complex production. Nickel chloride and ligand were mixed in a solvent, then the solution filtered to remove areactive elements, evaporated to a mushy state and dried. Recrystallization was performed for further purification. The obtained complexes, spectral and magnetic properties are listed. All were paramagnetic and had close to a tetrahedral configuration. The complexes had the formula of $NiL_2X_2$. The findings are indicative of partial involvement of multiple bonds with metal atoms in coordination. The complexes presented catalytic activity and selectivity. Analysis of nuclear magnetic resonance and infrared spectra was used to check the structure of the synthesized phosphine oxides. References 13: 9 Russian, 4 Western.
[illegible]

UDC 577.15.083.546.287

# CONTROLLED DESIGN AND SYNTHESIS OF BIOLOGICALLY ACTIVE SILICONE COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81
(manuscript received 26 Jan 81) pp 2691-2700

TYURINA, L. A., GAYLYUNAS, I. A., SEMENOV, V. A., TSYRLINA, Ye. M., SINGIZOVA, V. Kh. and SOLOV'YEVA, N. I., Institute of Chemistry, Bashkir Branch, USSR Academy of Sciences, Ufa; and Ufa Branch, All-Union Scientific Research Institute of Plant-Protecting Chemicals

[Abstract] An algorithm is proposed in the form of a system of routines in PL-1 language for the YeS-1022 computer, based on pattern recognition, game theories and regression analysis, to analyze the "structure-property" correlation, which is one of the stages of controlled ["directed"] synthesis of compounds with specified properties, to apply to the design of silicone ["organosilicon"] compounds. The process of analysis and design consists of the following stages: determination of informative tags, setting priority of structures among compounds in the instruction sequence for the purpose of use as basis for modifications, determination of relative contribution of structural elements of base structures to the desired function and of least informative elements, generation of potentially toxic and nontoxic structures. Data referable to toxicity of some compounds of the instruction sequence, partial tags that are informative for nontoxic and toxic compounds, recognition capacity of some rules for solutions, distribution of some tags according to priority of substitution, characteristics of synthesized compounds are tabulated; the instruction routine compounds are described in the form of 27 tag fragments, which permit determination of compound fragments consisting of 1-3 base fragments and logical tags (conjunctions and disjunctions of fragmentary [partial] tags without consideration of reciprocal position thereof). There are diagrams illustrating the design of compounds synthesized in order to check their hypothetical toxicity. References 11: 7 Russian, 4 Western.
[103-10,657]

UDC 546.19 + 541.8--165

## PHYSICAL CHEMICAL STUDY OF $CaO-H_3PO_4-H_3AsO_4-H_2O$ SYSTEM AT 25°C: REPORT 3

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA
KHIMICHESKIKH NAUK in Russian No 2, Issue 1, Jan 82
(manuscript received 15 Dec 79) pp 80-86

AFANAS'YEVA, V. A., MALYUROVA, A. A. and GRANKINA, Z. A., Institute of Inorganic Chemistry, Siberian Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] An earlier report (Afanas'yeva, 1981) presented results of study of sections of the title quadruple system with initial Ca:(P+As) ratios equal to 2.0 and 1.67. The present report presents data on a section from a more acid region where the initial ratio was 1.45. Methodology was discussed in the earlier report. The solid phases obtained were identified by powder-grams of all stable samples, with a sharply defined apatite structure being the predominant phase. The ratio of Ca : P ranged from 1.33 to 1.67. The notion of defective structure was confirmed using infra-red spectroscopy, and the presence of a pyro-group was further confirmed by chemical analysis. Calcination (at 800°C for 5 hours) proceeded more rapidly in air than in the closed ampule variation of the test. It is concluded that the section of the four-fold system $CaO--H_3PO_4--H_3AsO_4--H_2O$ with initial ratio Ca : (P + As) = 1.45 yields a phase of changing composition that can be regarded as a "defective" arsenate-phosphate apatite. Figures 3; references 14: 3 Russian, 11 Western.
[141-12131]

---

UDC 546.181.1 + 518.053.7

## SYNTHESIS AND X-RAY STUDY OF RUBIDIUM POLYPHOSPHIDE $RbP_{11}$

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA
KHIMICHESKIKH NAUK in Russian No 2, Issue 1, Jan 82
(manuscript received 1 Dec 80) pp 93-97

[illegible], V. I., POTAPOVA, O. G., [illegible], V. P., POLYANSKAYA, T. M. and [illegible], Ye. A., Institute of Inorganic Chemistry, Siberian Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] The title polyphosphide was produced from red phosphorus and rubidium in a argon stream, with atomic ratios of phosphorus to rubidium of 15 : 1 and 9 : 1. Iodine was added as a catalyst in some tests, and not used in others. The products were boiled in a KOH solution to remove white phosphorus and other hydrolyzing polyphosphides. After centrifuging to separate

the polyphosphides formed, the latter were dissolved in a mixture of carbonate and sodium nitrate for analysis. Chemical analysis showed the irregular crystals to have approximately 20% rubidium and 80% phosphorus by mass. The catalyst made it possible to produce larger crystals. The phosphorus framework was composed of cluster chains or bridged atoms without thorough compound formation, and the various phosphorus chains with the single formula of $P_{11}^{-}$ suggest the possibility of phase transformations in the lattice of these polyphosphides that are related to restructuring of the phosphorus framework. Figures 2; references 13: 9 Russian, 4 Western.
[141-12131]

UDC 547.496.3

## REACTIONS OF PHOSPHORYL THIOUREAS WITH MERCURY OXIDE AND NUCLEOPHILIC REAGENTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 9 Mar 81) pp 64-68

ZONTOVA, V. N., GRAPOV, A. F. and MEL'NIKOV, N. N., All-Union Scientific Research Institute of Chemical Plant Protective Agents, Moscow

[Abstract] A synthetic method was developed for phosphorylguanidines, -isoureas and isothioureas based on heating phosphorylthioureas with mercury oxide and molecular sieves in benzene and in presence of nucleophilic reagents. When this mixture was heated in alcohol, $N^2$-phosphoryl-$N^1$-phenyl-O-alkylisourea was formed; with amines, corresponding nonsymmetrical phosphorylguanidines were formed. In all cases, $N^2$-phosphoryl-$N^1$,$N^3$-diphenylguanidines were formed as byproducts. Analogously, the reactions with ethylmercaptan and thiophenol yielded corresponding mixtures of phosphorylisothioureas with $N^2$-phosphoryl-$N^1$,$N^3$-diphenylguanidines. References 5: 3 Russian, 2 Western.
[[illegible]]

UDC: 615.734:615.785.4:615.787

## MUSCARINOLYTIC ACTION OF SOME AMINOALKYL ESTERS OF HYDROXYALKYL PHOSPHINIC ACIDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 262, No 2, Jan 82 (manuscript received 12 Aug 81) pp 479-482

VOLKOVA, R. I., GODOVIKOV, N. N., KABACHNIK, M. I., academician, KARDANOV, N. A., LUKOMSKAYA, N. Ya., MIKHEL'SON, M. Ya. [deceased], [illegible], S. Ye., CHEPAYKINA, T. A., SHATAYEVA, G. A. and SHELKOVNIKOV, S. A., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; and Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad

[Abstract] Determination was made of the possibility of enhancing muscarinolytic action of aminoalkyl esters of phosphinic acids by addition of an OH group in the acid part of the molecule, as well as the influence of replacement of the planar ester group of heavy acetylcholine analogues with a group containing a tetrahedral atom of phosphorus. For this purpose several iodomethylates of aminoethyl esters of hydroxyalkyl phosphinic acids were synthesized with different groups in the acid and ammonia part of the molecule. Activity was tested on the isolated small intestine of guinea pigs. Methylfurmethide [?] served as the muscarinic agonist. Acetylcholinesterase activity was tested on human erythrocyte acetylcholinesterase and butyryl cholinesterase of equine blood serum. The muscarinolytic activity of 10 compounds was tabulated, as well as their anticholinesterase activity, which was relatively mild in all of them. There was blocking of muscarinic cholinoreceptors by hydroxyalkyl phosphinic acid ethers. References 7: 5 Russian, 2 Western.
[[illegible]]

UDC 547.341 + 546.185'131

## PROPERTIES OF β-CHLORO-β-(α-THIENYL)VINYLPHOSPHONIC AND β-CHLORO-β-(α-THIENYL)VINYLTHIOPHOSPHONIC ACID DICHLORIDES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 25, No 1, Jan 82 (manuscript received 18 Apr 80) pp [illegible]

NAZVANOVA, G. F., MOSKVA, V. V., SITDIKOVA, T. Sh. and KASHFAROVA, F. A., Chair of Organic Chemistry, Kuybyshev State University; Institute of Chemical Technology imeni S. M. Kirov, Kazan'

[Abstract] Addition of 0.7 g ethanol to a mixture of 3.92 g β-chloro-β-(α-thienyl)vinylphosphonic acid dichloride (I) in 15 ml ether gave a 26.9% yield of the ethyl ester of β-chloro-β-(α-thienyl)vinylphosphonic acid (II) chloride, b.p. 303 K/0.08; $d_4^{20}$ 1.4753, $n_D^{20}$ 1.5994. When 1.23 g of methanol in [illegible] ml ether was added to a mixture of 5 g I in 50 ml ether at 268 K, the product was the dimethyl ester of II obtained in 72.8% yield, b.p. 392-393 K/0.12; $d_4^{20}$ 1.3762, $n_D^{20}$ 1.5875. Diethyl ester of II was obtained in an analogous manner: b.p. 400-402 K/0.01; $d_4^{20}$ 1.2863, $n_D^{20}$ 1.5575. When the reaction was carried out in presence of triethylamine, I was dehydrochlorinated yielding β-(α-thienyl)ethynylphosphonic acid dichloride. Analogous reactions of the vinylthio acid are indicated. The structures of all products were supported by IR and NMR $^1H$ and $^{31}P$ spectra. Figure 1; references: 3 Russian.
[[illegible]-7813]

UDC 547.1+547.241+547.233

## FERROCENYLAMINOMETHYLPHOSPHONATES AND FERROCENYLAMINOMETHYLTHIOPHOSPHONATES CONTAINING HETEROCYCLIC RADICALS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 25, No 1, Jan 82 (manuscript received 9 Jun 80) pp [illegible]-47

[illegible], V. I. and FEDOROV, B. S., Chair of Organic Chemistry, Chernovtsy State University

[Abstract] Reaction of equimolar quantities of formylferrocene, dialkyl ester of phosphorous acid and a heterocyclic amine at room temperature gave ferrocenylaminomethylphosphonates with heterocyclic radicals. Following amines were used: 1-amino-1,3,4-triazole, 2-aminopyridine, 3-aminopyridine, [illegible]-aminobenzo-1,4-dioxane and 2-aminothiazole. Formylferrocene reacted

[illegible] with O,O-diethylthiophosphorous acid in presence of primary and secondary amines giving quantitative yields of ferrocenylaminomethylthiophosphonates. Even a mixture of equimolar quantities of formylferrocene, dialkyl ester of phosphorous or thiophosphorous acid and N-phenyl- or N-p-tolyl-β-D-glucosamine gave moderate yields of ferrocenylphosphonates containing D-glucose components. References 7: 6 Russian (2 by Western authors), 1 Western.
[154-7813]

UDC: 547.26.118

## ISOMERIZATION OF $P^{III}$ ACID ESTERS UNDER INFLUENCE OF ORGANIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81
(manuscript received 21 Jan 81) pp 2657-2661

AL'FONSOV, V. A., GIRFANOVA, Yu. N., BATYYEVA, E. S. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry, Kazan' Branch, USSR Academy of Sciences

[Abstract] On the basis of data in the literature and previous studies, two hypotheses are expounded about the mechanism of cis-transisomerization of cyclic phosphites: reversible break of P-O bond in the phosphorinane ring with inversion of atom of phosphorus, bonding with thermodynamically more stable trans-phosphite and attachment of the acid to phosphite with formation of a pentacoordinated product that can also change into a trans-phosphite due to tourniquet rotation and dissociation of acid. It is believed that formation of an O-protonated product is involved in isomerization into derivates of phosphonic and phosphinic acids. Reactions that were run: trimethylphosphite with diethylphosphor acid; trimethylphosphite with dimethylphosphoric acid; dimethylphosphonite with diethylphosphoric acid, dimethylmethylphosphonite with acetic acid; 2-methoxy-4-methyl-1,3,2-dioxaphosphorinane; diethylethyl phosphonite with diethylphosphoric acid. Nuclear magnetic resonance spectra of $^{31}P$ were recorded on a KGU-4 instrument and paramagnetic resonance spectra were recorded on a Varian T-60 spectrometer. References 18: 14 Russian, 4 Western.
[[illegible]-10,[illegible]]

UDC: 547.241'298+539.194

## INFRARED SPECTROSCOPY USED TO STUDY STRUCTURE OF AMIDES AND HYDRAZIDES OF PHOSPHORYLATED CARBOXYLIC ACIDS

[illegible] ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81
(manuscript received [illegible] Dec 80) pp 2661-2665

[illegible], V. I., YAFAROVA, R. L., TARASOVA, R. I. and RAZUMOV, A. I.,
Institute of Chemical Technology imeni S. M. Kirov, Kazan'

[Abstract] The structure of amide, butylamide and hydrazide of diethylphosphinyl acetic acid was studied in view of the fact that phosphorylated carboxylic acids have been found to have much biological activity on the example of the tranquilizer, gidiphen, which had vegetotropic and anticonvulsive [antiepileptic] activity. Frequencies of main bands of characteristic vibrations of amides and hydrazide of the above-mentioned acid in methylene chloride solution are tabulated. A UR-20 instrument was used to record infrared spectra. It was demonstrated that there are cis- and trans-conformations of P=O and C-C(O) bonds in dilute solutions of the three compounds studied. Figures 3; references: 13 Russian.
[illegible]

---

UDC: 547.26'118

## [illegible] COMPOUNDS OF TETRACOORDINATED PHOSPHORUS ATOM

[illegible] ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81
[illegible] pp [illegible]-2669

[illegible]

[illegible] of prior work by this author, where it was con[illegible] have an additive influence on reactivity in compounds [illegible] phosphorus atom, where substitutes A and B in compounds of [illegible] table share of influence on reactivity, independently [illegible]. Alkaline hydrolysis reaction constants for $(RO)_2P(O)X$ phos[illegible] hydrolysis reaction constants for $(RO)_2P(O)CH$ esters [illegible] phosphorous acids at 80°C were determined and tabulated. [illegible] confirmed that the share of influence of substitutes is constant in the [illegible] compounds. A correlation equation was offered to find the reaction [illegible]: $\log k_R = \log k_{CH_3} + \Phi$ where $\Phi$ is the difference between log k [reaction constant] $(CH_3)RP(O)X$ and log k $R_2P(O)X$ with transition from the [illegible] radical to radical R. Values of $\Phi$ for some substitutes in the above [illegible] are listed. References 17: 16 Russian, 1 Western.
[illegible]

UDC: 547.241+547.341

## PHOSPHORUS-CONTAINING INTERMEDIATE PRODUCTS AND DYES, PART 6: SYNTHESIS OF DERIVATIVES OF ALIPHATIC-AROMATIC PHOSPHONIC AND PHOSPHINIC ACIDS BASED ON REACTIONS OF PHOSPHORUS PENTACHLORIDE AND PHOSPHORANE ETHYLTETRACHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81
(manuscript received 9 Dec [illegible]) pp [illegible]-2674

[illegible], V. V., MITRASOV, Yu. N. and KUKHTIN, V. A. [deceased],
Chuvash State University imeni I. N. Ul'yanov

[Abstract] This study was pursued because of the key role played by derivatives of aromatic phosphonic and phosphinic acids in synthesis of phosphorus-containing dyes, and references are made to findings in previous reports in [illegible]. Here, reactions of phosphorus pentachloride with allylarenes and [illegible]styrenes, as well as of phosphorane ethyltetrachloride ["ethyltetrachlorophosphorane"] with p-methoxystyrene were studied in a quest for new intermediate products. The methods of nuclear magnetic spectra, recorded on [illegible] instrument, and infrared spectra (Spectromom-2000 instrument) were used. After treatment of intermediate products with sulfur dioxide or acetone, interaction between m-, o-allylanisole, o-allyltoluene and phosphorus pentachloride produces diacid chlorides of 2-chloro-3-arylpropylphosphonic acids. Phosphorus pentachloride and phosphorane ethyltetrachloride could be readily [illegible] with methoxystyrenes; p-, o-methoxystyryl phosphonous, phosphonic and [illegible] ethylphosphinic acids were produced after dissociation of intermediate adducts of reaction by sulfur dioxide or ordinary phosphorus. References 7: 6 Russian, 1 Western.
[[illegible]]

UDC: [illegible]+547.491+547.79'118.3

## [illegible] OF BENZIL WITH ACID CHLORIDES OF TRIVALENT PHOSPHORUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81
(manuscript received 14 Mar 81) pp [illegible]-2675

[illegible], [illegible], [illegible]NOVA, [illegible] and [illegible]MENSKIY, N. I., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Experiments were conducted in a benzene and methylene chloride medium, with or without triethylamine, to investigate interaction between benzil [illegible] and acid chlorides of [illegible]. Nuclear, paramagnetic resonance and infrared spectrum studies were pursued, as well as analysis of

elements to identify the compounds formed, with $PCl_3$ serving as the phosphorus containing constituent: dioxaphospholenes (2-chloro-4,5-diphenyl-1,3,2-, [illegible]-4,5-diphenyl-1,3,2-dioxaphospholenes). The mechanism of formation of [illegible] and formulas are offered to describe the [illegible] thereof. This is the first time that [illegible] with $P^{III}$ using α-keto alcohol, whereas in the [illegible] studied comprehensively in this respect. [illegible]

[illegible]

UDC: 546.185

## [illegible] AMIDOCHLOROPHOSPHAZO ALKANES

[illegible] ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81 [illegible] pp 2678-2684

[illegible], V. A., MARCHENKO, A. P. and PINCHUK, A. M., Institute of Organic Chemistry, Ukrainian Academy of Sciences, Kiev

[Abstract] Triamidochlorophosphazo alkanes (R' = R" = Alk) are new compounds previously synthesized by the authors and found to be good reagents for synthesis of various compounds containing phosphorus and nitrogen. Both [illegible] radical compounds can be synthesized by alkylating chlorophosphazo compounds with alkyl halides, some of which contain allyl [illegible] and have not been described before, but are of interest for synthesis [illegible] triamides. Conditions for producing reactions are described [illegible] triamidochlorophosphazobenzenes, alkyl iodide and bromide. [illegible] compounds react with nucleophilic and electrophilic agents--[illegible] and alkyl halides--and can be used to synthesize [illegible] phosphoric and phosphorous acids, triamidochlorophosphonium [illegible] alkanes and tetraamidophosphonium halides. [illegible], [illegible] Western.

[illegible]

UDC: 547.341

## PHOTOINITIATED INTERACTION OF PHOSPHORUS TRIBROMIDE WITH PHENYLACETYLENE AND STYRENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81 (manuscript received [illegible]) pp [illegible]

[illegible], N. V., BELYAYEVA, T. N., DOGADINA, A. V., KHOLMOGOROV, V. Ye., [illegible], [illegible] and PETROV, A. A., Leningrad Technological Institute imeni Lensoveta

[Abstract] Previous studies demonstrated that phosphorus tribromide interacts with phenylacetylene in the presence of oxygen, but a similar reaction with styrene could not be induced. Here, photoinitiation was used to bind phosphorus tribromide with both compounds via multiple bonds, yielding 1-phenyl-1-dibromophosphino-2-bromethane through interaction with allyl [illegible], with identification of its structure by means of nuclear magnetic resonance spectra and chemical methods. It was demonstrated that photoinitiation initiates a chain radical process, with atomic bromine serving as carrier of the chain. The phenylacetylene reaction with $PBr_3$ was completed within [illegible] min, whereas with styrene an equilibrium was established within about [illegible] min, with no more than 60% conversion. Ultraviolet light was used to initiate the interactions, resulting in production of the 1-phenyl-1-dibromophosphine-2-bromethene compound, due to its effect on a mixture of 1-phenyl-1-dibromophosphine-2-bromethane and phenylacetylene. With a mixture of phenylacetylene and styrene only the product of the reaction of $PBr_3$ with styrene is demonstrable at first, and further exposure to ultraviolet light caused total conversion of the phenylacetylene. References: 3 Russian. [138-[illegible]]

UDC: 547.455:546.183

## SYNTHESIS OF N-GLYCOSYL AMIDOPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81 (manuscript received 19 Feb 81) pp [illegible]

NIFANT'YEV, E. Ye., RUMYANTSEVA, S. A., KOROTEYEV, M. P., SISNEROS, Ks. and KOCHETKOV, N. K., Moscow State Pedagogic Institute imeni V. I. Lenin

[Abstract] Previously unknown N-glycosyl amidophosphites were synthesized by means of phosphorylation of N-glycosyl amines. Deep distillation in vacuum was used to isolate the obtained compounds: N-methyl-N-(2,3;5,6-di-O-isopropylidene-α-D-mannofuranosyl-1-amido)-N',N"-tetramethyl diamidophosphite,

[illegible],N',[illegible]-di-O-isopropylidene-α-D-mannofuranosyl-1-amido)-N',N"-tetramethyl diamidophosphite and N-methyl-N-(2,3;5,6-di-O-isopropylidene-α-D-mannofuranosyl-1-amido)-1,3-butylene phosphite, with N-methyl-2,3; 5,6-di-O-isopropylidene-α,β-D-mannofuranosyl amine and N-n-tolyl-2,3; 5,6-di-O-isopropylidene-α-D-mannofuranosyl amine as initial compounds. The properties of these phosphites include ready binding of sulfur, interaction with methanol with production of trimethyl phosphite and glycosyl amine, rapid reactions with methyl iodide at room temperature yielding stable quasiphosphonium salts, dissociation of C-N bond with use of sodium phenolate in benzene with production of O-phenyl glycoside, demonstrating that such systems can be used for glycoside synthesis. References: 1 Western.
[10[illegible]-10,[illegible]]

UDC: 547.241

INTERACTION OF PHOSPHORUS PENTACHLORIDE AND ITS DERIVATIVES WITH SODIUM THIOSULFATE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 12, Dec 81
(manuscript received 2 Jun 81) pp 2808-2809

[illegible]KHIN, B. V., VENGEL'NIKOVA, V. N. and KALABINA, A. V., Irkutsk State University imeni A. A. [illegible]

[Abstract] This is the first time that spontaneous interaction has been demonstrated between sodium thiosulfate, which was first thoroughly dried in vacuum at [illegible]-120°C, and phosphorus pentachloride without use of solvent. This [illegible] that contains $POCl_3$ and $PSCl_3$, according to nuclear [illegible] spectrometry. It was concluded that interaction between [illegible] and $S_2O_3^{2-}$, which is a dual-action nucleophil, con[illegible] the atom of phosphorus in the substrate by either the atom [illegible]r, yielding mainly phosphoryl derivatives. A Varian [illegible] to record the nuclear magnetic resonance spectra [illegible]. $P^{III}$ compound production from reduction products was not [illegible]: [illegible] Western.
[illegible]

UDC 547.241

## PHOSPHORYLATED AND THIOPHOSPHORYLATED AMINOHETEROCYCLIC COMPOUNDS

Moscow USPEKHI KHIMII in Russian Vol 51, No 2, Feb 82 pp 239-265

RAZVODOVSKAYA, L. V., GRAPOV, A. F. and MEL'NIKOV, N. N., All-Union Scientific Research Institute of Chemical Plant Protection Substances, Moscow

[Abstract] Numerous aminoheterocyclic derivatives have economic uses, e.g., in medications and other biological applications, including fungicides and pesticides. Advances in producing phosphoryl- and thiophosphorylaminoheterocyclic compounds for plant protection are summarized in subcategories of phosphorylating tetracoordinated phosphorus atoms with acid chloranhydrides and various other derivatives, phosphorylating with phosphorus pentachloride and derivatives of trivalent phosphorus, and phosphoryl-amide [illegible]ization reactions. Reactions of phosphorylated and thiophosphorylated aminoheterocyclic compounds include reactions with trivalent phosphorus derivatives and with tetracoordinated phosphorus derivatives, and other reactions. The conversion of phosphorylaminoheterocyclics in the environment and in living organisms is noted. Both theoretical and practical advances are anticipated in the future. References 170: 68 Russian, 102 Western.
[140-12131]

UDC 541.64:547.241

## POLYPHOSPHAZENES

Moscow USPEKHI KHIMII in Russian Vol 51, No 2, Feb 82 pp 266-284

KIREYEV, V. V., MITROPOL'SKAYA, G. I. and ZINOVICH, Z. K., Moscow Chemical Technology Institute imeni D. I. Mendeleyev

[Abstract] This review attempts to categorize works on synthesis and study of properties of linear homopolyphosphazenes, which have appeared since the last such reviews around 1975. Study of thermal destruction of polydichlorophosphazenes has shown that impurities on the vessels used in mixing and in the mixture itself are involved in the reaction. Reactions involving other polyhalogenphosphazenes are discussed, including those for hexachlorocyclotriphosphazene and octaphenylcyclotetraphosphazene. Polyorganophosphazenes employed to develop heat-resistant and fireproof rubbers include polyperfluoroalkylphosphazenes, trifluorotoxy- and octafluoroamyloxyphosphazenes. Lower glass points and more effective synthesis are subjects of study for these compounds. Properties being studied include mass molecular characteristics, structure, thermal stability, and vulcanization procedures. Applications

of these polyphosphazenes in such fields as biomedicine and as elastic and semirigid foams are being developed. Figures 2; references 151: 21 Russian, 130 Western.
[140-10101]

UDC 547.26'118

## REACTION OF TRIMETHYLPHOSPHITE WITH 2,5-BIS(CARBOMETHOXY)-3,4-DIPHENYLCYCLOPENTADIENONE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82 (manuscript received 1[illegible] Jan 81) pp 12-18

ARBUZOV, B. A., FUZHENKOVA, A. V. and ROZHKOVA, N. F., Chemical Institute imeni A. M. Butlerov; Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The title reaction was carried out in continuation of the studies of various factors controlling regional selectivity of the addition of phosphoric nucleophiles to cyclones. Specifically, the goal was to evaluate the effect of COOMe group on the reaction of 2,5-bis(carbomethoxy)-3,4-diphenylcyclopentadienone (I) with $P(OMe)_3$ (II) and to determine whether a 1,4-addition to the C=C-C=O system takes place. Reaction of I with II occurs at room temperature yielding dimethyl-(3-dimethoxyphosphinoyl)-2-methoxy-4,5-diphenyl-1,4-cyclopentadienyl)-1,3-dicarboxylate, m.p. 146-148°C. Along with this major product small quantities of dimethyl-(2-dimethoxyphosphinoyloxy-5-methyl-4,5-diphenyl-1,4-cyclopentadienyl)-1,3-dicarboxylate and dimethyl-(2-dimethoxyphosphinoyloxy-5-methyl-4,5-diphenyl-1,3-cyclopentadienyl)-1,3-dicarboxylate were formed, m.p. 101-103°C and 105-111°C respectively. It was shown that the behavior of I in reactions with II was different from the behavior of tetracyclone and of the condensed aromatic cyclones. Attempts to isolate other reaction products which could illuminate the reaction mechanism were unsuccessful. The intermediate dipolar product of 1,6-addition was reacted with tertiary alkylamines yielding ammonium salts of 2,5-bis(methoxycarbonyl)-1,3-dimethoxyphosphinoyl-3,4-diphenyl-1,3-cyclopentadienyl oxide, m.p. 146-147°C. References 12: 9 Russian, 3 Western.
[153-7813]

UDC 547.26'118

## EFFECT OF AMINE CHLOROHYDRATES ON REACTION COURSE OF TETRAALKYLDIAMIDOTRIMETHYLSILYLPHOSPHITE WITH ACETYL CHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 21 Jan 81) pp 19-21

AL'FONSOV, V. A., GIRFANOVA, Yu. N., BATYYEVA, E. S. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of USSR Academy of Sciences

[Abstract] The goal of this work was to study the reaction of tetraethyldiamidotrimethylsilylphosphite (I) with acetyl chloride and to determine whether this reaction is acid catalyzed. When I was reacted with acetyl chloride at -5°C, the products were tetraethyldiamidoacetylphosphonate (II) and diethylamidotrimethylsiloxychlorophosphite (III) formed in 95:5 ratio. When this reaction was repeated in presence of equimolar quantity of diethylamine hydrochloride, the product ratio was 50:50. Thus it was shown that acid reagents play a decisive role in this reaction. References: 7 Russian.
[153-7813]

---

UDC 542.91:547.1.118

## MIXED CHLORINATED ESTERS OF DIALKYLPHOSPHORIC ACIDS AND THEIR BIOLOGICAL PROPERTIES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 17 Dec 80) pp 21-24

ARBUZOV, B. A., ZOROASTROVA, V. M., NEKLESOVA, I. D. (deceased), KUDRINA, M. A., MOLODYKH, Zh. V. and TUDRIY, G. A., Kazan' State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Experimental results have been reported of the study of antifungal properties and of the toxicity of mixed esters of dialkylphosphoric acids containing β,γ-dichloro and γ-monochloropropyl substituents and of their respective alcohols--possible products of ester hydrolysis. Analysis of fungicidal activity and toxicity showed that an increase in alkyl radical of up to $C_6$ led to higher fungicidal activity with lower toxicity. Further elongation of the alkyl radical reduced the antifungal activity. In the group of alcohol-substituted products, only β-chloropropyl alcohol exhibited pronounced fungicidal activity but at much higher doses. References 4: 2 Russian, 2 Western.
[153-7813]

UDC 546.183+547.467.32

## REACTIONS OF TRIVALENT PHOSPHORUS COMPOUNDS WITH AZIDOCARBOXYLIC ACIDS, PART 2: PHOSPHAZOBETAIN-PHOSPHORIC ISOMERIZATION

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 3 Feb 81) pp 24-30

[illegible], M. P., GUSAR', N. I. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] Reaction of 2-phenyl-4,5-benz-1,3,2-dioxaphospholane (I) with azidoacetic acid (II) yielded 2,3-benz-5-phenyl-1,4,6-trioxa-5-phospha-9-azaspiro[4,4]-7-nonanone, m.p. 174°C. When the ethyl ester of II was reacted with I, the product was 1,3-bis(ethoxycarbonylmethyl)-2,4-diphenyl-2,4-[illegible]dioxy)-1,3,$2_{\gamma}^{5}$,$4_{\gamma}^{5}$-diazadiphosphetidine, m.p. 190°C. When [illegible]phine was reacted with α-azidobutyric-, α-azidoisovaleric- and α-azidoisobutyric acids, the products were the respective betaines. With trialkylphosphites, azidocarboxylic acids react like the parent II forming the esters of N-phosphorylated amino acids after rearrangement of the intermediate phosphazo compounds. References 9: 5 Russian, 4 Western.
[illegible]

UDC 547.241+547.33

## REACTIONS OF β-NITROSTYRENES WITH TRIALKYL PHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 18 Oct 80) pp 35-40

[illegible], N. M., ZYABLIKOVA, T. A., IL'YASOV, A. V. and SHERMERGORN, I. M., Kazan' Veterinary Institute imeni N. E. Bauman; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Reactions of β-nitrostyrene with trimethyl phosphite was studied in acetic acid, a strong proton donor. A complex mixture of phosphorus-containing compounds was obtained, consisting of dimethyl-α-phenyl-β-nitroethylphosphonate, dimethyl-α-styrylphosphonate and 1,2-bis(dimethoxyphosphinyl)phenylethane. Analogous results were obtained when p-fluoro-β-nitrostyrene was reacted with trimethylphosphate in acetic acid. When naphthaline was added to the reaction mixture of trimethylphosphite with β-nitrostyrene, the product formed was 2-dimethoxyphosphinyl-2-methoxy-2-phenylacetaldoxime. Dimethyl-α-styrylphosphonate and dimethyl-α-acyl-β-nitroethylphosphonate appear to have about the same formation rates. References [illegible]: 7 Russian, 6 Western.
[illegible]

UDC 547.341

## HALOGENATION OF DIALKYL ESTERS OF 5-METHYL-1,3,4-HEXATRIENE-3-PHOSPHONIC ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 25 Feb 81) pp 178-181

ANGELOV, Kh. M., STOYANOV, N. M. and IONIN, B. I., Higher Pedagogical
Institute of Shumen, Bulgaria; Leningrad Technological Institute imeni Lensovet

[Abstract] Experimental results are reported of the halogenation of dialkyl esters of 5-methyl-1,3,4-hexatriene-3-phosphonic acid. The reaction was carried out in anhydrous non-polar solvents ($CCl_4$, $CHCl_3$, $CH_2Cl_2$, etc.) at -8° to -12°C, yielding cyclized 3-vinyl-4-halo-1,2-oxaphosphol-3-enes. Structure assignment was supported by spectral data and elemental analysis. Figure 1; references 5: 4 Russian, 1 Western (by a Russian author).
[153-7813]

---

UDC 547.341

## SYNTHESIS OF SIX-MEMBER BICYCLIC PHOSPHORUS-CONTAINING HETEROCYCLES--DERIVATIVES OF 1,2-OXAPHOSPHORINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 12 Mar 81) pp 181-185

ANGELOV, Kh. M., KHRISTOV , V. Kh. and KIRILOV, M., Higher Pedagogical
Institute of Shumen, Bulgaria

[Abstract] It was shown that halogenation of dialkyl esters of 2-chloro-2-(1-cyclohexenyl)ethenephosphonic acids leads to a 6-member cyclization of 1,3-diene system O=P-C=C-C=C. The reaction was carried out in $CCl_4$ at 50-60°C. After the removal of solvent and vacuum distillation or recrystallization from heptane, 2-alkoxy-4-chloro-5-halo-2-oxobicyclo[4,4,0]-1-oxa-2-phospha-3-decenes were obtained in 67-88% yield. Structure of final products was supported by IR and NMR spectra. Figure 1; references: 8 Russian.
[153-7813]

UDC 547.26'118

## REACTION OF N-(PHENYLALKOXYMETHYLENE)AMIDOETHYLENEPHOSPHITE WITH CARBONYL COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 7 May 81) pp 207-208

[illegible], [illegible] V., CHERKINA, M. V., BURNAYEVA, L. A. and PUDOVIK, A. N.,
Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] It was shown that equimolar quantities of 2-phenylethoxymethylenamido-1,3,2-dioxaphospholane and the nitrile of benzoylformic acid yield 1,3,2-dioxaphospholane-2-spiro-7'-(4',5',9',10'-tetraphenyl-4',9'-dicyano-5',10'-diethoxy-3',8'-dioxa-1',6'-diaza-2'$\lambda^5$,7'$\lambda^5$-diphosphatricyclo [5,3,0,$0^{2',6'}$]decane)-2'-spiro-2"-1",3",2"-dioxaphospholane--a dimer of the intermediate product with an endocyclic P=N bond, m.p. 143-144°C. 2-Phenylmethoxymethylenamido-1,3,2-dioxaphospholane reacted with benzylidenacetylacetone to yield 5-phenylmethoxymethylenamino-3-acetyl-2-methyl-4-phenyl-1,6,9-trioxa-5$\lambda^5$-phosphaspiro[4,4]non-2-ene, m.p. 95°C. References 5: 4 Russian, 1 Western.
[illegible]

---

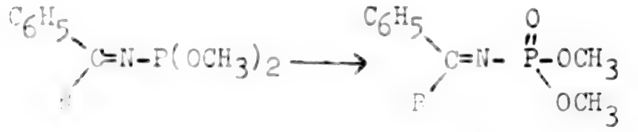
UDC 547.26'118

## ISOMERIZATION OF METHYLENAMIDOPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received [illegible] Jun 81) pp 208-209

[illegible], [illegible], [illegible]KHINA, Z. A., SINITSA, A. D., KAL'CHENKO, V. I. and
PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin;
Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] Heating a mixture of phenyldialkylaminomethylene- and diphenylmethylenamidodimethylphosphites in a sealed ampule (under argon atmosphere) at [illegible]°C for [illegible] hrs gives quantitative yields of the respective esters of methyl[illegible]onic acid:



I, II, III

I R = $N(CH_3)_2$ m.p. 42-44°C

II R = $N(C_2H_5)_2$ b.p. 140-142°C/$10^{-2}$mm Hg

III R = $C_6H_5$ m.p. 93-95°C.

References [illegible] Russian, [illegible] Western.
[illegible]

UDC 547.26'118

## REACTION OF DIALKYLMONOTHIOPHOSPHORIC AND DIPHENYLMONOTHIOPHOSPHINIC ACIDS WITH CYCLOHEXYLISONITRILE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 1 Jul 81) pp 209-211

ZIMIN, M. G., ZABIROV, N. G. and PUDOVIK, A. N., Kazan' State University
imeni V. I. Ul'yanov-Lenin

[Abstract] According to a patent, reaction of cyclohexylisonitrile with diethylthiophosphonic acid yields a stable O,O-diethyl-S-(N-cyclohexylformimidoly)thiol phosphate (I). This reaction was reinvestigated by the authors and discovered that the product was actually cyclohexylthioformamide (II), b.p. 108°C/0.05 mm Hg. An assumption was stated that the formimidation of P(IV) monoacids yields initially unstable α-adducts of the I type which then under the action of $HSOPR_2$ convert to II. According to the proposed schematic, another product of this conversion should have been the thionepyrophosphate. Indeed, tetraphenylthionepyrophosphinate was isolated in pure state, m.p. 192-193°C. References 6: 3 Russian, 3 Western.
[158-7813]

UDC 547.341

## SYNTHESIS OF α-DIPHENYL(DIISOPROPYL)PHOSPHINYL-β-PHENYLPROPIONIC ACID ESTERS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 1 Jul 81) pp 211-212

ISMAGILOV, R. K., RAZUMOV, A. I. and BEZBORODOVA, T. A., Kazan' Chemical-Technological Institute imeni S. M. Kirov

[Abstract] To a potassium derivative obtained from the reaction of 1.06 g K and 7.8 g diphenylphosphinylacetic ester, 3.5 g benzyl chloride was added, the mixture was stirred for 12 hrs at 90-100°C, most of the solvent was removed, KCl was separated by centrifugation and the residue was recrystallized to give the ethyl ester of α-diphenylphosphinyl-β-phenylpropionic acid, m.p. 136-139°C. Analogously the α-diisopropylphosphinyl-β-phenylpropionic ester was obtained, b.p. 168-171°C/0.2 mm Hg, $d_4^{20}$ 1.0743, $n_D^{20}$ 1.5125. References: 2 Russian.
[158-7813]

UDC 547.341

## SYNTHESIS OF m-DIALKYL(DIPHENYL)PHOSPHINYLMETHYLBENZOIC ACID NITRILES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 1 Jul 81) pp 212-213

[illegible], ISMAGILOV, R. K., ZABUSOVA, N. G. and BARANOVA, N. Yu.,
Kazan' Chemical-Technological Institute imeni S. M. Kirov

[Abstract] Arbuzov rearrangement of the ethyl esters of dialkyl(diphenyl)phosphinous acids with m-chloromethylbenzoic acid nitrile (I) was studied. A mixture of ethyldipropylphosphinite and I was heated to 80-90°C for 3 hrs. m-Dipropylphosphinylmethylbenzoic acid nitrile was obtained upon distillation of the reaction mixture, showing a b.p. 170-173°C/0.5 mm Hg, m.p. 59-60°C. Analogously the m-diisopropyl analogue was obtained, m.p. 99-100°C. To obtain m-diphenyl homologue, the reaction mixture was heated to 130-135°C for [illegible] hrs before distillation; the product had a m.p. 194-195°C. Reference: 1 Western.
[[illegible]]

---

UDC 547.241+547.341

## REACTION OF PHOSPHINIC ACIDS WITH PHOSPHORUS THIOCHLOROXIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 1 Jul 81) pp 214-215

[illegible], [illegible], A. G. and FESHCHENKO, N. G., Institute of Organic
Chemistry, [illegible] Academy of Sciences, Kiev

[Abstract] A mixture of 0.011 mole of distyrylphosphinic acid and 0.15 mole [illegible] was refluxed for [illegible] hrs, 100 cc petroleum ether was added to the cooled reaction mixture and the precipitate was filtered off to yield distyrylthiophosphinic acid chloride (I) m.p. 119-120°C. Analogously the following compounds were obtained: di(β-chlorostyryl)thiophosphinic acid chloride, m.p. [illegible], [illegible]ylthiophosphinic acid chloride, b.p. 112°C/27 mm Hg, [illegible], and diphenylthiophosphinic acid chloride, b.p. 136-137°C/0.08 mm Hg, [illegible]. Reaction of I and dibutylamine gave dibutylamide of distyrylthiophosphinic acid m.p. 66-67°C, and with aniline--the respective anilide, m.p. [illegible]-165°C. References 3: 1 Russian. 2 Western.
[[illegible]]

UDC 547.241

## REACTION OF HYPOPHOSPHOROUS ACID WITH ACETYLENIC ALCOHOLS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 3 Jul 81) pp 215-216

BELAKHOV, V. V., YUDELEVICH, V. I., KOMAROV, Ye. V., IONIN, B. I. and PETROV, A. A., Leningrad Technological Institute imeni Lensovet; All-Union Scientific Research Technological Institute of Antibiotics and Fermentation Products for Medical Application

[Abstract] Reaction of hypophosphorous acid with acetylenic alcohols--propargyl and dimethylethynyl carbinols--was studied. The reaction is accompanied by an acetylene-allene rearrangement yielding propadienephosphonite (I), a yellowish oil, $n_D^{20}$ 1.4995 and 3-methyl-1,2-butadienephosphonite, also an oil, $n_D^{20}$ 1.5254. I was converted to p-bromoanilinic salt, m.p. 153-154°C. The structure of these products was supported with PMR and IR spectral data. References 13: 9 Russian, 4 Western.
[153-7813]

---

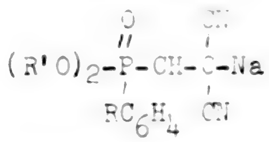
UDC 547.26'11

## SYNTHESIS OF SODIUM DERIVATIVES OF PHOSPHORYLATED 1,1-DICYANOETHANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 1, Jan 82
(manuscript received 2 Mar 81) pp 220-221

RYMAREVA, T. G., SANDAKOV, V. B., KHASKIN, B. A., PROMONENKOV, V. K. and KOROLEVA, T. I., All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] 1,1-Dicyanoethanes obtained by Knoevenagel reaction from malonic acid dinitrile and aromatic aldehydes are CH-acids. Their reaction with sodium hydride, metallic sodium or sodium alkoxide yields sodium derivatives



$$(R'O)_2-\overset{\overset{O}{\parallel}}{\underset{\underset{RC_6H_4}{|}}{P}}-CH-\overset{\overset{CN}{|}}{\underset{\underset{CN}{|}}{C}}-Na$$

Na derivatives of the following compounds were obtained: 1,1-dicyano-2-phenyl-2-diethoxyphosphorylethane, m.p. 179-180°C; 1,1-dicyano-2-(4-chlorophenyl)-2-diisopropoxyphosphorylethane, m.p. 191-192°C; and 1,1-dicyano-2-(4-fluorophenyl)-2-diethoxyphosphorylethane, m.p. 192-193°C. References 2: 1 Russian, 1 Western.
[153-7813]

UDC 547.594.4.03

# [illegible]: NEW TYPE OF HORMONAL PLANT-GROWTH INHIBITORS

[illegible] PRIRODNYKH SOYEDINENIY in Russian No 6, Nov-Dec 81
[illegible] May 81) pp 733-738

[illegible], V. Ye., CHEKUROV, V. M., YAROSHENKO, N. I. and
[illegible] of Organic Chemistry, Siberian Branch, USSR
[illegible] Novosibirsk; Institute of Cytology and Genetics,
[illegible] Academy of Sciences, Novosibirsk

[illegible] obtained from wheat coleoptiles were tested for
[illegible]. While the presence or absence of the second
[illegible] affect growth inhibiting, where the third
[illegible] in diol IV only large concentrations inhibited
[illegible] activity was noted for 2,3-epoxy-derivatives of
[illegible] importance of the A fragment ($R = CH_3$). Epimeri-
[illegible] at $C_4$ also brought reduced activity, but replacing the
[illegible] epiisocembrol produced an active compound. These results
[illegible] effect was not a unique property of
[illegible] element was determined to be fragment A.
[illegible] and three tested for growth inhibit-
[illegible] structurally closest to isocembrol had the best
[illegible] given in an experimental section.
[illegible], 5 Western.
[illegible])

# POLYMERS AND POLYMERIZATION

## NEW HEAT RESISTANT POLYMERS FIND PROMISING INDUSTRIAL APPLICATIONS

Moscow EKONOMICHESKAYA GAZETA in Russian No 4, Jan 82 p 12

[Article by USSR Academy of Sciences Corresponding Member M. Koton, director, Institute of High Molecular Compounds, USSR Academy of Sciences: "New Jobs for Polymers"]

[Text] "Materials of a thousand uses" is what polymers are often called owing to the diversity of their properties. And rightfully so.

Polymers consist mostly of carbon atoms. When we add other light atoms to them, for example hydrogen or fluorine, we get polyethylene or fluoroplastic, widely used in industry. Add phosphorus atoms to a polymer, and it takes on a new, especially valuable quality--incombustibility.

The universal properties of these materials are helping to hasten development of modern machine building, electrical engineering, radio, electronics and aviation. What I mean is that polymers exhibit high strength, they are elastic, and they are resistant to penetrating radiation, ultraviolet light, sunlight, caustic liquids (oils, solvents, acids, alkalis) and corrosion. The areas of use of films, varnishes, synthetic fibers and fabrics are continually growing in industry.

### Stronger Than Metal

Scientists, process engineers and producers must develop improved and economical production processes, giving us various materials of the highest quality, on the basis of recent achievements in polymer physics and chemistry. By doing so they will complete the task posed by the 26th CPSU Congress--ensuring 65-72 percent growth in production of synthetic resins and plastics, and 36 percent in production of fibers and chemical filaments.

In recent years the Institute of High Molecular Compounds, USSR Academy of Sciences did much both to create new films and fibers and improve existing ones. Working jointly with the OKhT's [not further identified] "Plastpolimer" Scientific-Production Association (Leningrad) it raised the strength of ordinary mass-produced film and of a number of other polyethylene articles. By altering the internal structure of polymer chains in polyethylene it was able to raise film strength by 1.5-2 times, and apparently this is not the limit. Note that today, half of all polyethylene produced in the country is used to manufacture film. The latter is made into packaging for various goods and into greenhouse and hothouse walls. An experimental industrial facility producing high strength polyethylene strapping tape was created at "Plastpolimer." The tape it is now producing can withstand higher loads than the steel bands which are usually used on heavy crates.

Engineers of the Leningrad "Pechatnyy Dvor" Printing Office helped to create a machine which automatically packs goods into heavy boxes using a polyethylene rather than a metallic conveyer belt. The demand for such equipment is very great. This is why the collective of the Association imeni K. Marks (Leningrad) is building another 10 machines capable of handling not seven lines simultaneously, as with the experimental facility, but 12. The first machine unit of this series has already been placed into operation.

## They Will Withstand Both Heat and Cold

Heat resistant polymers, which are becoming increasingly more necessary in modern technology, occupy an important place in the activities of scientists of the Institute of High Molecular Compounds, USSR Academy of Sciences. It is very important to have polymers which could withstand temperature changes from -200° to +350°, and short-term rises to +400° and higher. So-called polyarimides have such possibilities.

These unique materials were developed by the institute jointly with the "Plastmassy," "[illegible]k" and "Khimvolckno" scientific-production associations in Moscow. Polyarimides are the basis for making PAK varnish, PM electrician's tape, brand RR [illegible] polyarimide, brand SP binders and adhesives, PM-67 and PM-69 molding material and "Arimid-T" brand fiber.

PM polyarimide film, as an example, can be heated to +350° for a long period of time and up to 400° and higher for a short period of time without deterioration of its properties. It does not lose its shape, it does not melt, and it retains high strength. Absence of brittleness even at the temperature of liquid helium is a completely unique property of PM film. Conductors covered with it withstand ex- [illegible] heating, and they resist various deformations and vibrations well. The [illegible] of polyarimide insulation is 2-2.5 times less than that of traditional [illegible], meaning that the weight of air-cooled aircraft generators can be reduced by [illegible] percent and their overall dimensions can be decreased.

The [illegible] of using just a single ton of PM film in electric motors is [illegible] rubles. We should add that it has a low coefficient of friction, [illegible] resistant to wear.

[illegible] PAK varnish and [illegible]-imid enamel are valuable insulating materials. [illegible] dramatically improved the basic characteristics of electric motors [illegible] especially complex and critical conditions and increased their life [illegible]. They have been used as the basis for creating entirely new [illegible] generators and other machines. Application of polyarimide [illegible] of submersible pumps for super-deep oil wells and in [illegible] industry has been met by operators with high praise. There are other [illegible] into which polymers are being introduced as well--production of printed circuits, small film capacitors for electronic apparatus, equipment for computer [illegible], and devices for radio navigation and radio astronomy.

The properties of polyarimides are being improved mainly by raising their heat resistance. Mention should be made of the heat resistant fibers and fabrics made from them. In terms of physicomechanical properties they are on par with synthetic fibers, and they are extremely resistant to high temperatures on the order of +300°. These materials do not burn, and they are more fire resistant than [illegible]ly processed fibers now being produced by industry.

Practically total retention of shape at high temperatures is an extremely interesting property of polyarimide fibers, one not exhibited by other synthetics. This is why "Arimid" and "Arimid-1" fibers are used as insulation on heat resistant winding conductors and on cables. They are used to make hoods for soft heat insulation and as heat protection for various articles. The good chemical stability of polyarimides at high temperature makes it possible to use them to filter dust from hot gases or to trap valuable products in nonferrous and ferrous metallurgy and in cement, mining and chemical industry.

## Versatile Rolivsans

Another important technical task that scientists of the Institute of High Molecular Compounds, USSR Academy of Sciences have completed in cooperation with a number of scientific research institutes and enterprises is that of creating heat resistant, high strength compounds. This was a very complex task. A heat resistant polymer which could be used as insulating material and as a binder for plastic reinforcement had to be created. The difficulty of the problem lay in the fact that these materials had to be liquid and readily meltable, while in their operating state they had to be hard and very strong. Oligomers (low molecular weight of polymers) with a [illegible] had to be used for this purpose.

The new materials came to be called "rolivsans"--an acronym for reactive oligomers (ROL) developed by the Institute of High Molecular Compounds, USSR Academy of Sciences (IVSAN). Rolivsans are easily melted, meaning that they can be processed into articles of required shape by traditional methods. Materials have appeared which can withstand high heating in the form of insulating, embedding, impregnating and sealing compounds and binders for reinforced plastics. The originality of the development has earned a large number of author's certificates.

Rolivsans are to be produced on a large scale in the present five-year plan. Electric motors with windings dipped in rolivsan will become more reliable and last longer. Chemical storage tanks will become more resistant to the long-term effects of concentrated substances at high temperatures. Electronics, aviation and radio engineering are also making successful use of rolivsans.

According to tentative estimates the economic impact from using the new polymers in aviation industry will be 3,000 rubles per unit of product for electric generators, and in electrical engineering industry it will be more than 2 million rubles just in relation to electric locomotive motors alone.

In addition to valuable operating properties of polymers such as extremely high strength and heat resistance, the possibility of creating effective protection against vibrations and noise with polymers is attracting interest today. The possibility of using polymers to absorb vibrations and reduce noise stems from a unique combination of elasticity and viscosity properties. As a result polymers significantly reduce the amplitude of vibrations experienced by structures.

Vibration and noise absorbers are created in the form of polymer coatings (pastes, paints), or what is more effective, as sandwich panels with a layer of film in between. The main task scientists are working on is to create multicomponent polymer systems that could be used to produce materials exhibiting high vibroacoustic effectiveness over a wide temperature and frequency.

The 1982 plan for scientific research foresees completion of efforts to create a number of [illegible] polymers. The interest displayed by various sectors in rolivsan has already led to the appearance of three new brands of materials. Creative cooperation with Moscow's "Plastik" Scientific-Production Association is making it possible to broaden the possibilities of polyarimides. They will have more-stable technical characteristics. Film quality will improve. We can cite many more examples of [illegible] polymers created by the Institute of High Molecular Compounds, USSR Academy of Sciences. Many of them have achieved practical uses owing to joint work with other institutes and enterprises. However, the output of these materials is behind the national economy's demand today. There have been delays in introducing these materials, even though industry is now awaiting their appearance.

Everyone agrees that unless we create a broad laboratory and plant experimental base at the scientific-research institutes and large enterprises, we cannot achieve fast implementation of the achievements of science. Going from experimentation to an experimental model, and from it to experimental industrial and then industrial production is the shortest path, especially in chemistry. I feel that we should set up enterprises that would specialize in the development and manufacture of laboratory and experimental equipment of various types--from models to equipment used in experimental production. Experimental instrument making and machine building plants must have special experimental design offices tending to the needs of research institutes and other scientific organizations.

[illegible]

UDC: 678.6:541.64

## NEW ROUTE FOR SYNTHESIS OF AROMATIC POLYMERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 262, No 2 Jan 82
(manuscript received 14 Oct 80) pp 355-359

SALAZKIN, S. N., RAFIKOV, S. R., corresponding member of the USSR Academy of Sciences, TOLSTIKOV, G. A. and ZOLOTUKHIN, M. G., Institute of Chemistry, Bashkir Branch of the USSR Academy of Sciences, Ufa

[Abstract] Electrophil substitution was tested as a means of synthesizing aromatic polymers, using pseudo-acid chlorides of carboxylic acid capable of ring-chain isomerism for selective polycondensation reactions. New aromatic polymers were selectively synthesized presenting valuable properties, which are of interest for chemical conversions of heterocyclic phthalides without altering the main polymer chain. The chemical formulas of several of the polymers (polyarylenes) are tabulated, and conditions of synthesis described. Demonstration of an asymmetrical carbon atom in some of the acid chlorides suggests the possibility of synthesizing stereoregular polymers.
References 14: 4 Russian, 10 Western.
[116-10,657]

UDC: 542.952.6:547.574.4:535.215

## SYNTHESIS, POLYMERIZATION AND PHOTOCONDUCTOR PROPERTIES OF p-AMINOSTYRENE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 48, No 1, Jan 82
(manuscript received [illegible]) pp [illegible]

[illegible], SYROMYATNIKOV, V. G., [illegible] and SINYAVSKIY, V. G.,
Kiev State University imeni T. G. Shevchenko

[Abstract] Polymeric azomethines [methyleniminines] are promising for recording information on silver-free carriers. Azomethines based on p-aminostyrene were synthesized to compare them to previously synthesized methacryl azomethine derivatives. Electron absorption spectra of vinyl azomethines in methanol, yield of 1 type of polymers as a function of reaction time during polymerization of 6 monomers in toluene, yield of polymers as a function of reaction time during polymerization in dimethylformamide, and electron absorption spectra of trinitrofluorenone and polymer with trinitrofluorenone in dioxane are illustrated. Properties of the six 3-$R_2$-4-$R_1$-benzylidene-4'-vinylanilines, rate of monomer polymerization and electrophotographic properties of the polymers are tabulated. Dilatometry was used to examine polymerization kinetics,

using constant concentrations of vinylazomethines and azodiisobutyric acid dinitrile in toluene and dimethylformamide. The findings indicate that the polymers formed take a charge well and hold a surface charge, but their photosensitivity is less marked than that of poly-N-vinylcarbazole. Figures 4; references: [illegible] Russian.
[[illegible]-10,69[illegible]]

UDC 541.6

## RESEARCH DEVELOPMENT IN AREA OF HIGH STRENGTH THERMALLY STABLE POLYMERS FOR NATIONAL ECONOMY

[illegible] VESTNIK AKADEMII NAUK SSSR in Russian No 1, Jan 82 pp 3-10

[Abstract] At a meeting with the Presidium of the USSR Academy of Sciences, [illegible] Institute of High Molecular Compounds, USSR Academy of Sciences, M. M. Koton reported on the developmental work carried out in his institute. One of the more interesting areas is devoted to strong polymer materials capable of retaining their properties in a wide range of temperatures. [illegible] noted that the strength of such polymers depends on the oriented [illegible] polymer molecules. Considerable effort is devoted to [illegible] in synthetic fibers. Among the thermally stable products, [illegible] polyimides [illegible] important role; they are unique in that they do not [illegible] fire; they are also resistant to radiation. [illegible] applications in transportation, electric and metallurgy industries [illegible]ted. M. M. Koton's paper was discussed by V. A. Kabanov, [illegible], G. I. Kudryavtsev and A. S. Chegolya: all of them cited [illegible] current achievements in their respective organizations. [illegible], President of the USSR Academy of Sciences [illegible] these advances to the national economy.
[[illegible]]

UDC 541.64:537.311

## SURVEY OF STUDIES ON SYNTHESIZING HIGH-TEMPERATURE POLYMERIC SUPERCONDUCTORS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 2, Feb 82
(manuscript received 30 Jun 80) pp 227-232

SHUVAYEV, V. P. and SAZHIN, B. I., Okhtin Scientific Production Association
"Plastpolimer"

[Abstract] Accomplishing innovative production of high-temperature superconductors as an area worthy of research is regarded as on the level of achieving controlled thermonuclear synthesis, hence the authors survey developments aimed at products with critical temperatures of at least 90°K, permitting use of liquid nitrogen instead of expensive and scarce helium. For this, sources other than metals and their alloys must be found, since currently the best product has been a niobium-germanium alloy with a critical temperature of 23.2 K. Non-metallic and organic products such as synthetic lipids and natural biological membranes are currently being investigated. Phonon and exciton mechanisms are being studied for various high-molecular substances with low relative electrical resistance and ideal diamagnetism. Among exciton mechanisms, special interest is engendered by "sandwich" structures of metal-semiconductor-metal or metal-dielectric-metal configurations, by unidimensional or quasi-unidimensional polymetal organic compounds, where so-called "Copper pairs" are formed, and by variations on the "sandwich" type involving synthetic lipid membranes or natural biological membranes. All of these efforts remain experimental. Figures 6; references 17: 4 Russian, 13 English.
[143-12131]

UDC 541.64:539.3

## MECHANISM FOR INCREASING IMPACT STRENGTH OF PLASTICS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 2, Feb 82
(manuscript received 17 Jul 80) pp 261-265

PETROVA, R. I., AYVAZOV, A. B., ZELENEV, Yu. V. and ZAVAROVA, T. B.,
Moscow Textile Institute

[Abstract] Polyvinylchlorides and polymer compositions based on them were studied to determine their energy absorption in comparison to that of ABS plastics and shock-resistant polystyrene. The polyvinylchlorides were modified with methylmethacrylate, butadiene and styrene copolymers. Specimens

with 0.01 mkm coatings of copolymers were subjected to mechanical loss tests at various temperatures. Compositions with copolymer modifiers showing glass points markedly below the test temperatures had great shock resistance. This was related to a relaxation time range which was in proportion to the polymer's ability to absorb energy. This phenomenon was recorded for polystyrenes, but not for polymer compositions based on PVC. The tests indicated that increasing low-temperature shock resistance requires the addition of rubber-like relaxational compounds that will absorb the shock energy through relaxational processes that are preserved at the test temperatures. Figures 4; references 12: 7 Russian, 5 English.
[[illegible]-12131]

UDC 541.64:547.313.2:546.821

## EFFECTS OF LOW-MOLECULAR BY-PRODUCTS ON PROPYLENE POLYMERIZATION RATE IN CATALYTIC SYSTEM BASED ON $TiCl_3$

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 2, Feb 82 (manuscript received 18 Dec 80) pp 377-385

ALADYSHEV, A. M., LISITSYN, D. M. and D'YACHKOVSKIY, F. S., Institute of Chemical Physics, USSR Academy of Sciences

[Abstract] The effects of low-polymeric product formation on propylene polymerization was studied when $TiCl_3$ + $Et_2AlCl$, and $TiCl_3$ (TAC-132) + $Et_2AlCl$ catalysts were used. The microspherical catalyst was obtained by reduction of $TiCl_3$ with an organic aluminum compound. It was found that in the presence of the heterogenous $TiCl_3$ + $Et_2AlCl$ catalyst, isotactic and atactic polypropylene formation was accompanied by dimerization of the liquid monomer and isomerization of the propylene dimers formed during the process. Chromatographic data show that the composition and component ratios of dimers from the Japanese TAC-132 catalyst and the highly active catalyst are practically the same, but the yields differ. Details of the processes are presented, and differential theoretical models that agree with the experimental findings are shown. Figures 4; references 12: 6 Russian, 6 Western.
[illegible]

UDC 541(64 + 15):547.36

## RADIATIONAL LOW-TEMPERATURE CATION GRAFT POLYMERIZATION OF VINYL-n-BUTYL ETHER TO POLYVINYLCHLORIDE IN GLASS POINT RANGE

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 2, Feb 82
(manuscript received [illegible] Dec 80) pp [illegible]

KUDRYAVTSEV, Val. N. and KABANOV, V. Ya., Institute of Physical Chemistry,
USSR Academy of Sciences

[Abstract] Polyvinyl chloride swelling in the monomer and the system's glass point were studied by thermomechanical analysis and thermostimulation current methods, and radiational graft polymerization by a gravimetric method. Grafting was accomplished by adding PVC with ground metallic sodium to a monomer solution and reducing pressure to $10^{-2}$-$10^{-3}$ Pa, while drying in a manner that did not affect the grafting. It was found that the thermostimulation current method was more effective in registering maxima of freeing and recombining irradiated ions and electrons that formed during low-temperature polymer radiolysis. Tests in the temperature range of -60 to +10° C showed maximum grafting between -20 and -14° C, after which it dropped sharply; this was the transition range from a glass-like state to an elastic one. In the glass point range with radiation above 10 kgr, poor changes in grafting were related to using up monomer molecules in the sample, with some of them forming homopolymers. The end of ion grafting above the glass point range is connected to the sharp increase in molecule diffusion speed of water molecules. Figures 2; references 13: 7 Russian, 6 English.
[149-12131]

# RUBBER AND ELASTOMERS

UDC 678-19:539.61:539.4

## TEMPERATURE EFFECT ON ADHESIVE PROPERTIES OF THERMOPLASTIC POLYMER MIXTURES

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 44, No 1, Jan-Feb 82
(Manuscript received 16 Oct 80) pp 132-135

[illegible], L. G., PUPINSKIY, I. K. and YEGORENKOV, N. I., Gomel' University;
Institute of Metal-Polymer Systems Mechanics, BSSR Academy of Sciences, Gomel'

[Abstract] The goal of the present study was to evaluate the adhesive strength of various mixtures of thermoplastic polymers with aluminum. The following powdered polymers were used: polyvinylbutyral, polyethylene, pentaplast and polychlorotrifluoroethylene. Binary mixtures of these compounds were prepared on a high speed mixer. The adhesives were obtained by thermal compression of a powder layer between two aluminum foils. The behavior of various mixtures was plotted against the experimental temperature range (270-[illegible]). It was shown that the mixture studied exhibited non-additive, temperature-dependent properties which in some cases exceeded the values of the starting components. Figures 2; references: 15 Russian.
[illegible]

UDC 541.182.023:541.183.03:542.4:531.71:547

## [illegible] OF SOME FACTORS ON LIMITING (STATIC) SHEAR STRESS OF CARBAMIDE [illegible] WITH n-HEPTANE

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 44, No 1, Jan-Feb 82
(Manuscript received 2 Oct 80) pp 136-140

[illegible], V. A., KRUPINA, A. A., RYBINA, T. V. and BOLOTINA, I. R.,
[illegible] Petrochemical and Gas Industry imeni I. M. Gubkin, Moscow

[Abstract] The rheological properties of carbamide complexes with n-alkanes [illegible] poorly studied. In the present paper results are reported of [illegible] systematic studies of limiting static shear stress of such complexes [illegible]. Four fractions of carbamide were investigated. The results showed [illegible] all fractions (all degrees of dispersion δ related to size of particles)

exhibited analogous behavior with time: initial sharp increase of the limiting static shear stress to a given maximum, followed by a sharp drop and then a gradual increase with time. When temperature effect was studied (293-311 K), the limiting shear stress also exhibited analogous behavior with time, regardless of the size of particles; minimal $P_s$ value in the first stage of rapid growth was observed at 293 K, maximum $P_s$ value - at 30[illegible] K. Figures 3; references: 6 Russian.
[[illegible] - [illegible]13]

UDC 541.64:539.2

## EQUILIBRIUM SWELLING OF FILLED NATURAL RUBBER VULCANIZATES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 2, Feb 82 (manuscript received 5 May 81) pp 414-419

ANFIMOVA, E. A., LYKIN, A. S. and ANFIMOV, B. N., Scientific Research Institute of Tire Production

[Abstract] The Kraus equation, according to which swelling of the rubber phase, which at the surface equals zero, gradually increases with increasing distance from the surface and at a certain distance becomes isotropic, was tested for its application to natural rubber in benzene containing various amounts of Soviet PM-50 carbon black and imported HAF carbon black. Vulcanizates were subjected to consecutive extraction with acetone for 30 hours and benzene for 48 hours until all non-rubber impurities and sol-fractions were removed. A close correlation was established between swelling maxima and concentrations of active chains. In sulfur or peroxide vulcanization, lateral bonds in filled resins were markedly less than in corresponding unfilled resins. Reduced swelling retardation along with increased thickness of the vulcanized structure bear out the reduction in the relative rubber-carbon black bond role in the swelled system. These and other findings bear out the theoretical model proposed by Kraus, with the rubber phase of the filled, vulcanizate containing two parts, an isotropically-swelled matrix and an unswollen structure in which the molecular mobility has been retarded by the carbon black. Figures 5; references 9: 3 Russian, 6 Western.
[149-1131]

UDC 678.664.541.18.02

## SYNTHESIZING AND PROPERTIES OF URETHANE ELASTOMERS BASED ON POLY-EPSILON-CAPROLACTONE AND POLYOXYPROPYLENE GLYCOL

Moscow KAUCHUK I REZINA in Russian No 2, Feb 82
(manuscript received 6 Feb 81) pp 8-9

KAMLYUK, L. M., PYATKOVA, V. I., KOSTRAKOVA, V.I. and CHAYKINA, N. M.,
Scientific Research Institute for Tire Production

[Abstract] In seeking cold-resistant polyurethane products with high durability and dynamic features, elastomers based on resins polyoxypropylene glycol, poly-epsilon-caprolactone, 2,4-toluylenediisocyanate, and 4,4'-diphenylmethanediisocyanate were synthesized and studied with 3,3'-dichloro-4,4'-diaminodiphenylmethane as a lengthening agent and butanediol-1,4 for obtaining highly modular elastomers. Results showed that replacing 2,4-toluylenediisocyanate with 4,4'-diphenylmethanediisocyanate improved the "Jung module," tear resistance and elasticity. Fatigue resistance also increased, but other durability properties were below those of elastomers based on polytetrahydrofuran. Samples with poly-epsilon-caprolactone, fortified with butanediol-1,4 were equal in many properties to polytetrahydrofuran elastomers and superior in fatigue resistance to them. References: 5 Russian.
[146-12131]

UDC 678.043:541.6

## ESTERACRYLATE DERIVATIVES AS MODIFIERS OF TREAD RUBBER

Moscow KAUCHUK I REZINA in Russian No 2, Feb 82 (manuscript received 11 May 81) pp 32-33

YALOVAYA, L. I., KAVUN, S. M. and SAKHNOVSKIY, N. L.
Scientific Research Institute for Tire Production

[Abstract] Study was made of the relative effectiveness of several esteracrylate derivatives, and of their effects as modifiers of the technological and technical properties of tread rubber based on 100% butadiene-styrene rubber with a sulfur-containing vulcanization system. Various derivatives that are currently in use or soon to be produced commercially were tested, including polyfunctional trimethacrylate triethanolamine, a 1:1 mix of alpha-trimethacryl-omega-methacrylpentaerythrite (dimethacrylpentaerythritadipinate) and alpha, omega-dimethacryl(bis-triethyleneglycol) phthalate, and bifunctional tri(oxyethylene)-alpha, omega-dimethacrylate (TGM-3), and alpha, omega-dimethacryl(bis-rhiethyleneglycol)phthalate (MGF-9). Results showed the polyfunctional derivatives to be the most promising for tread rubber use due to [illegible] greater activity in grafting and homopolymerization. References: [illegible] Russian (one translated from English).
[[illegible]-12131]

## WATER TREATMENT

UDC: 628.327:621.359.7

# ELECTRODYALYSIS USED TO PURIFY LIQUID SEWAGE CONTAINING CYANIDE

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 12, Dec 81
(manuscript received 2 Apr 80) pp 2722-2726

MUSAKIN, D. A., NEBOGATIKOV, V. B., LARIN, E. P. and SHUYSKIY, D. B.,
All-Union Design and Scientific Research Institute of Combined Energy Technology

[Abstract] A test was made of electrodialysis as a means of purifying liquid waste of galvanic plants, resulting from washing products after the cadmium, copper and zinc plating process. A filter-press type electrodialyzer was used, in which there were alternating MKK-1 and MAK-1 membranes, separated by a K-8 capron screen, with stainless steel cathode and anode of titanium coated with manganese dioxide. Tests were made using sodium cyanide solutions and solutions simulating local and mixed liquid waste from the above operations. Formulas of technological solutions, main parameters of process of demineralization of cyanide-containing solutions were tabulated, and curves plotted for changes in pH as a function of concentration of CN groups, change in voltage drop in the dialyzer and electric conduction of diluate as a function of dialysis time, changes in total CN group concentration and simple cyanide concentration as a function of time, as well as yield of energy transfer of cyanides as a function of their concentration. The results demonstrated the efficacy of this technique for both local purification of liquid waste containing cyanide, as well as mixed waste containing this compound. Figures 4; references: 4 Russian.
[110-10,657]

UDC 628.3

## REMOVING POLYMER POLLUTANTS FROM EFFLUENT WATER

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 2, Feb 82 pp 6-9

STRUKOV, F. I., SVATIKOV, V. P. and PANKOVA, T. P., engineers, Voronezh Branch, All-Union Scientific Research Institute of Synthetic Rubber

[Abstract] When emulsion divinyl-styrenes and divinyl-nitrile rubbers are washed clean of salts and other impurities, the waste waters also carry off significant amounts of fine rubber particles. The proposed system of removing the latter with a "boiling" layer of polystyrene offers the possibility of removing 92-98% of these particles using small devices. Another pollutant, latex particles, which clog piping, wells and primary settling tanks for biodegrading, has been removed by a labor-intensive process involving aeration for coagulation followed by scraping. A proposed constant system uses electrolytes to attract the latex, forming emulsifiers such as sodium alkylsulfonate, sulfonol NP-3 and Nekal, or suspensions such as lathers of synthetic fatty, tarry and paraffin acids. Suitable antisintering agents are required to prevent coagulation. The latex polymers thus removed could be used in construction for pipe insulation. Figures 3; references: 7 Russian.
[142-12131]

UDC 628.543:66.048

## RATIONAL SYSTEM FOR NEUTRALIZING LIQUID WASTES

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 2, Feb 82 pp 27-29

AVDEYEVA, E. I., engineer, BELOSTOTSKIY, M. D., candidate of technical sciences, and MAKHMUDOVA, I. K., engineer, All-Union Scientific Research Institute of Water Supply and Sewage Systems, Hydrotechnical Installations, and Hydrogeological Engineering

[Abstract] Currently, polyester producers burn off condensates after use, since no effective method for recycling diols has been employed. A system has been developed, after first trying simple distillation and rectification at atmospheric temperature, which uses vacuum rectification. To maintain the vacuum, the oxygen source was hydrogen peroxide, rather than air. Ethylene glycol loss was reduced from 91.5 to 0.3 tons per year, and the remaining water fraction of the condensate was suitable for use in the plant's water system. Figure 1, references: 2 Russian.
[142-12131]

CSO: 1841

- END -

# END OF FICHE

# DATE FILMED

May 11, 1982